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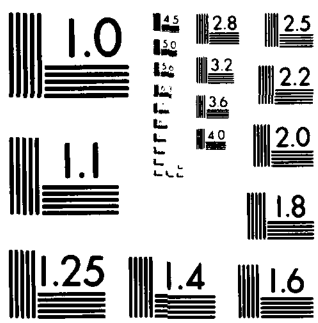

MICROCOPY RESOLUTION TEST CHART

Technical Report P-112

POMCUS System

Type II Forward Storage Site Facilities

Volume 2

by

Robert L. Porter

Construction Engineering Research Laboratory
September 1980

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This two-volume report provides comprehensive generic information for the design and construction of future Prepositioned Materiel Configured to Unit Sets (POMCUS) installations, with specific attention to:

1. The particular facility requirements of POMCUS installation user/occupants in accomplishing the storage, maintenance, and issue functions.

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Block 20 continued.

2. The military threats and vulnerabilities.

3. The NATO construction funding justification provisions.

4. The lessons learned from the daily operations and Return of Forces to Germany (REFORGER) exercises occurring on the existing Combat Equipment Group–Europe (CEGE) sites.

Information in this report was compiled from three sources relevant to the decision-making process: (1) supplies and equipment data, (2) Army and Congressional literature, and (3) the experience and knowledge of CEGE personnel.

Volume 1 presents POMCUS-related supply and equipment data from the Army Automated Data System (TAADS), and discusses ways to improve POMCUS. Volume 2 outlines design information for POMCUS facilities and sites.

FOREWORD

This investigation was performed for the Directorate of Military Programs, Office of the Chief of Engineers (OCE), under Project 4A762731AT41, "Military Facilities Engineering Technology"; Task C, "Construction Operations T/O"; Work Unit 026, "POMCUS Site Facilities Layout Requirements." The OCE Technical Monitor was COL Paul J. Theuer, DAEN-MPZ-U.

The work was performed by the Facility Systems Division (FS), U.S. Army Construction Engineering Research Laboratory (CERL). The assistance of Robert Doerr (Volume 1), and David Dressel, Marla Niksch, and William Niksch (Volume 2) is acknowledged.

Mr. E. Lotz is Chief of FS. COL Louis J. Circeo is Commander and Director of CERL; Dr. L. R. Shaffer is Technical Director.

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TYPE II FORWARD STORAGE SITE FACILITIES: POMCUS SYSTEM

INTRODUCTION: DEVELOPING FACILITY INFORMATION FOR PREPOSITIONED MATERIEL CONFIGURED TO UNIT SETS (POMCUS) SITES

Background

The U.S. Army's role in the defense of Western Europe requires the rapid reinforcement of NATO force ground combat units if enemy forces initiate hostilities. The combat-trained troops who comprise these replacement units are stationed at various Continental United States (CONUS) home stations, such as Fort Riley, KS. However, their combat equipment is stored and maintained in a ready-for-issue condition in the Federal Republic of Germany at Combat Equipment Group–Europe (CEGE) sites.

To facilitate the rapid deployment of the replacement units, the stored equipment and supplies are located at the CEGE sites in groupings specifically related to the military components, officially identified as POMCUS (Prepositioned Materiel Configured to Unit Sets). The CEGE site is the essential POMCUS physical facility and is made up of 20 to 30 buildings, vehicle parking areas, and a utility/roadway system. Annual Return of Forces to Germany (REFORGER) military exercises have been carried out to increase the operational capabilities of the combat units.

Problem

Currently, seven CEGE sites in the Federal Republic of Germany are fully operational. Three additional sites are being developed for occupancy during FY80. Recent strategy evaluations, however, have revealed that existing CEGE/POMCUS installations and their facilities are potentially vulnerable to enemy attack.

Objective

The objective of this work was to generate comprehensive, generic information for the design and construction of future POMCUS installations with specific attention to:

1. The particular facility requirements of POMCUS installation user/occupants in accomplishing the storage, maintenance, and issue functions

2. The military threats and vulnerabilities

3. The NATO construction funding justification provisions

4. The lessons learned from the daily operations and REFORGER exercises occurring on the existing CEGE sites.

Approach

Current, comprehensive, generic design information was systematically collected for the various military components assigned to CEGE installations. The numerous facility types at a CEGE installation (e.g., storage and maintenance) were identified so that the users and administrators of CEGE operations could input design information appropriately categorized for the research and planning teams using the information. Command personnel reviewed the information and forecasted the possible future POMCUS operational changes that could impact POMCUS site functions, and therefore the facilities.

Users of POMCUS Facility Information

The following users of this information have been identified:

1. Planning cells of the 21st Support Command (SUPCOM) dealing with development of a Project Summary and a Project Development Brochure (PDB) for future POMCUS projects.

2. U.S. Army, Europe (USAREUR), 21st SUPCOM and CEGE personnel dealing with training or familiarization programs for new personnel assigned to the POMCUS operations.

3. U.S. Army Construction Engineering Research Laboratory (CERL) research teams dealing with:

   a. Environmental constraints of CEGE sites

   b. POMCUS site layout design

   c. Camouflage of POMCUS sites

   d. Ammunition storage facilities

   e. Life-cycle cost optimization of POMCUS sites

   f. Controlled humidity storage facilities

g. General-purpose warehousing facilities

h. Weapon blast loading criteria for storage structures

i. Chemical/biological warfare facility implications

j. Decontamination of POMCUS site personnel and equipment.

4. Host Country Ministries of Defense/Construction in Federal Republic of Germany, Neatherlands, and Belgium:

a. Regarding future POMCUS sites in Europe.

b. This construction to be conducted in accordance with information provided in paragraphs 1 and 3 above, such as PDBs and research reports.

CEGE Facility Problems and Uncertainties

Analysis of the initial review of CEGE facilities currently in Central Germany (CENTAG) revealed a list of problems and uncertainties that are of concern to personnel responsible for POMCUS system readiness. Persons interviewed were assigned to the following U.S. Army groups:

1. USAREUR:

a. Logistics

b. Operations

c. War Reserve

2. 21st SUPCOM:

a. Assistant Chief of Staff, Engineering and Housing

b. Northern Army Group (NORTHAG) Planning Cell

3. CEGE–Europe:

a. Headquarters

b. East Battalion

c. First Company

d. Third Company

4. Engineer Division, Europe (EUD), Corps of Engineers, Frankfurt:

a. POMCUS Project Manager

The problems noted appeared to fall into six categories:

1. Site design and site location of CEGE installations:

a. It is difficult or impossible to obtain optimum parcels of land with enough contiguous acreage located appropriately for military strategy.

b. All necessary items (especially ammunition and petroleum, oils, and lubricants [POL]) are not available at each site to the extent that they are needed because of host nation agreement restrictions.

c. CEGE sites lack adequate adjacent area and transportation routes for incoming CONUS troops.

2. Storage and mobilization issue effectiveness vs. scheduled maintenance efficiencies:

a. Facilities are not capable of providing total "ready-for-issue," one-stop service.

b. The appropriate mobilization issue time is unclear. Different issue process times require different storage configurations.

c. Currently there are evaluation studies under way at USAREUR to determine whether batteries, fuel, tools, and other materiel will be uploaded or downloaded on vehicles. Uploading imposes greater time and personnel demands on scheduled maintenance operations, whereas downloading increases the number of mobilization issue steps.

d. A means of keeping incoming troop units separate and distinct during the issue process is necessary.

e. Since the personnel in a Company are essentially maintaining a Division's amount of equipment, the maintenance facilities must be much more efficient.

3. Site operation considerations:

a. Future, remote sites may be contractor-operated with personnel support obtained from surrounding communities. For noncontractor operations,

more life support facilities must be provided at the sites; most of these services are now provided by the larger military base command.

b. Training new personnel in POMCUS site operations is difficult since policies (e.g., uploading vs. downloading) seem to fluctuate cyclically.

c. There are equipment changes every year, which may cause the number and size of the items to change. Tailoring the facilities too specifically may constrain them in the future, e.g., there could be too much or too little controlled humidity warehouse (CHW) space, or too many or too few maintenance bays. Therefore, efficient operations require more adaptable facilities.

4. Mobilization capabilities:

a. The appropriate size of a military unit set for storage at one location is not clear. For example, if an entire Brigade (with a headquarters, combat battalions, and combat service support units) were located at a single site, all components could move away from the POMCUS installation as a fighting unit.

b. Each vehicle leaving a POMCUS site may have to be combat-ready, since the marshalling areas may not be available. Therefore, the current one-fourth-full fuel tank guidance for all vehicles may be inadequate if there are major travel distances to the marshalling areas.

5. POMCUS facility costs and funding sources:

a. The U.S. Congress has stipulated that all future POMCUS site construction funding beyond the current three sites will not be provided by U.S. appropriations including the prohibition to prefinance NATO eligible construction items, unless otherwise excepted.

b. Installation layouts and their buildings do not maximize their potential efficiencies for long-term energy conservation and manpower effectiveness for activities related to storage, maintenance, and issue functions.

c. Controlled-humidity storage building floor areas and enclosed volume are not being used efficiently.

d. Standardized plans should be used; for example, there are currently similar 12-, 16-, and 20-bay maintenance buildings, and it is too expensive to design each site differently.

6. Military vulnerability of CEGE facilities:

a. Site layouts do not minimize the effects of enemy air strikes and conventional artillery weapons, although thermal and direct visual camouflage techniques that can be applied to reduce the target vulnerability are being developed.

b. Building construction cannot withstand indirect conventional artillery weapons, nuclear blast overpressure, or persistent chemical droplets and mists.

The problems and uncertainties listed above were considered too extensive and continuing (i.e., they could not all be resolved simultaneously by a single authority) to allow a *definitive* documentation of POMCUS facility functional requirements at this time. Instead, it was determined that these problems and uncertainties required a comprehensive collection of integrated information from diverse sources that could be used to plan, program, and design POMCUS facilities. In addition, since the information originated from diverse sources, it probably contained conflicting statements that would require resolution during the development of a specific project.

Sources of POMCUS Facility Information

Researchers investigated the appropriate sources of relevant data in order to be most responsive to the POMCUS facility information needs of research teams and future planning cells. The problems and uncertainties listed above generated an awareness of the evolving character of both the POMCUS program and the facilities that have been developed at CEGE installations during the previous 9 years. Major issues concerning the basic storage, maintenance, and mobilization issue operations seemed to potentially impact the planning and design of the entire site and the individual facilities. The following information was collected to allow optimum decisions about specific future POMCUS facility development projects.

Three sources of facility-related information were found relevant to the decision-making process:

1. Data on POMCUS-related supplies and equipment that are currently stored and maintained at CEGE installations.

2. Literature extracts from Army Technical Manuals

(TMs), Army Regulations (ARs), research studies, Command letters, Congressional background papers, and *Army Logistician* articles.

3. User experience information obtained from USAREUR, 21st SUPCOM, CEGE, and EUD personnel.

Supplies and Equipment Data

Supplies and equipment are received, stored, maintained, and issued for a designated mix of military units, both divisional and nondivisional. Each military unit requires different quantities of various operational items for its own unique military mission. A portion of each unit's total supply and equipment inventory has been designated as relevant to POMCUS system facilities—the inventory that is received, stored, maintained, and issued at a POMCUS installation.

The U.S. Army Logistic Command at Fort Lee, VA, is the Major Command responsible for determining supply and equipment needs and for maintaining up-to-date computer printouts of military-unit-specific quantities. The source of facility information regarding equipment and supplies, amounts, weights, and cubage is the Fort Lee Logistics Center.

Literature

Many documents contain facility information relevant to installation planning. The bibliography at the end of this chapter lists all the literature investigated during this study. The TMs and ARs contain basic operations information, especially TM 38-450 (revised 1979). Information about POMCUS facility requirements and criteria on facility eligibility for potential NATO funding are provided in *NATO Criteria and Technical Standards for Construction of Type II Forward Storage Sites (FSTS) (POMCUS)* (1978). Finally, studies by the RAND Corporation and the U.S. Army Engineer Study Center, and Headquarters, Department of Army (HQDA) letter, "Rapid Reinforcement of NATO/Additional POMCUS and FY80 PWRMS" (September 1978), contain important POMCUS site concept information related to installation vulnerability and possible strategic improvements.

Information has been extracted from these sources and integrated into the formats described in **Format of This Report** (p 13).

User Experience

Since the establishment of the CEGE organization and operation, many military and civilian personnel have gained important experience and knowledge by participating in the receiving, storing, and maintenance activities, and in the periodic issue and turn-in activities of REFORGER mobilization exercises. In fact, they have tried many of the alternatives suggested for the problems and uncertainties listed in **CEGE Facility Problems and Uncertainties** (p 10). For example, both uploading and downloading policies have been attempted. In addition, the CEGE Battalion and Company personnel familiar with daily operations, and the CEGE HQ, 21st SUPCOM, and USAREUR personnel familiar with POMCUS installation policies all possess relevant information that can be useful only if it is integrated meaningfully.

Previous CERL work has developed three information categories for the design and construction of buildings: requirements, criteria, and guidance.[1] Proper use of this information allows the personnel involved in a project to maximize their contributions. Categorizing design information is especially important when several groups separately input, verify, or review facility information. For this POMCUS project, the following groups were involved:

1. Input information:

a. User/occupants of CEGE facilities and CEGE HQ staff

b. Deputy Chief of Staff, Operations (DCSOPS) personnel at USAREUR and 21st SUPCOM

c. Deputy Chief of Staff, Logistics (DCSLOG) personnel at USAREUR and 21st SUPCOM

d. Deputy Chief of Staff, Engineer (DCSENGR) and Installation Support Activity, Europe (ISAE) personnel at USAREUR and ACS E&H personnel at 21st SUPCOM

e. EUD personnel (POMCUS project managers)

f. NORTHAG Planning Cell of 21st SUPCOM.

2. Review and verify information:

a. All personnel listed in part 1 above

[1] *Concepts for the Generation, Communication, and Evaluation of Habitability Criteria*, Special Report D-78/ADA041187 (U.S. Army Construction Engineering Research Laboratory [CERL], June 1977).

b. DCSOPS personnel at DA

c. DCSLOG personnel at DA

d. Directorate of Military Programs personnel at OCE.

Format of This Report

This two-volume document uses three different formats to present comprehensive facility information for the user groups:

1. A tabular format presentation of POMCUS-related supply and equipment data from the Army Automated Data System (TAADS) *for 81 military units (Volume 1)*;

2. A narrative paragraph format presentation of article information written to improve POMCUS system facilities (Volume 1);

3. A categorized, segmented format presentation of specific space information as an integration of document statements and user/occupant input (Volume 2).

Figure 1 is the categorized table of contents for the document; the three information formats are differentiated as:

1. TAADS data (tabular data)

2. Improving POMCUS (narrative paragraphs)

3. Facility design information (segmented, categorized information developed for this project to clearly display functional space information from diverse—and thus possibly conflicting—sources).

The page formats of the third section contain seven specific types of information:

1. *Purpose.* This is a statement of overall mission for a specific part of a maintenance or storage facility.

2. *Issues.* This section tells whether the functions should be considered for possible decision trade-offs related to pollution, efficiency, or economy issues.

3. *Assumptions. These statements of the conditions* on which the facility information is based justify the recommendations.

4. *Activities-personnel-equipment.* These state specifically how the functional operations are performed, by whom, and with what equipment.

5. *Requirements.* These are qualitative statements of objectives, written in performance language, that describe a facility's objectives and its technical needs for accommodating the activities/personnel/equipment.

6. *Criteria.* These statements, developed directly from the requirements list, provide the quantitative means of determining the appropriate design solution for a facility.

7. *Guidance.* These statements, sketches, and diagrams are realistic advice, based on design experience, regarding the "optimum" qualitative solution.

Figure 2 shows the typical two-page format layout that was developed for presenting excerpts from documents. Figure 3 shows the typical two-page format layout developed for presenting the input of the user/occupants of existing CEGE installations.

As indicated in **CEGE Facility Problems and Uncertainties** (p 10), conflicting considerations may affect the planning and design of several POMCUS installation facilities; these must either be resolved or accommodated before specific project information is developed for PDB submissions. For example, the "NATO Criteria" document (Figure 2) identified certain facility requirements that are NATO-"PROVIDED" (i.e., possibly NATO-funded), whereas the user input for the same functional space identified other (or additional) facility requirements considered to be important for continuing operations that should be provided if NATO funds cannot be used for that portion of the project. The *facility design information* format was developed so that many sources of information about the same functional space could be integrated into specific design projects, yet still remain distinct to facilitate identification and periodic, separate updating. In the example cited, the PDB could contain the *specific* added requirements so that the *specific* additional project features could be approved and paid for by non-NATO funding. Assigning information from diverse sources to specific categories enables the user to quickly be aware of the inevitable conflicts inherent in any multi-source situation; as a result, constructive accommodations can be made, e.g., application for waivers, finding other funding sources, or making appropriate design trade-off compromises.

Summary and Recommendations for Updating This Report

This two-volume document is a comprehensive collection of integrated information from three sources determined to be relevant to the decision-making

process: (1) supplies and equipment data, (2) Army and Congressional literature, and (3) the experience and knowledge of CEGE personnel. Volume 1 presents TAADS data and discusses ways to improve POMCUS. Volume 2 outlines facility design information.

CERL compiled these two volumes with the goal of providing specific attention to (1) functional requirements for the storage, maintenance, and issue functions of POMCUS facilities, (2) military threats and vulnerabilities, (3) NATO construction funding justification provisions, and (4) experience gained from daily POMCUS site operations.

The current data contained in the "data" section of Volume 1 should be completely updated at the end of 1981 because continuing modifications in military unit supply and equipment assignments may significantly alter the areas and cubage currently shown. However, the changes occurring between now and the end of 1981 are considered within a reasonable "margin of error" for matching a specific military unit (or units) to a specific controlled-humidity warehouse.

Newly published articles related to improving POMCUS should be added to Volume 1 when they are deemed valuable to POMCUS installation planning and design decisions. The functional space facility information in Volume 2 should be updated annually by reviewing activities, personnel, equipment, facility requirements, and design guidance in terms of the best "state-of-the-art" POMCUS operations, especially the mobilization issue process. Such a review would be especially relevant after each REFORGER exercise to specifically document the experience gained. Throughout this report, there are blank spaces and "note" pages which readers may use for adding information based on their experiences from REFORGER exercises and from operating POMCUS sites. Several blank pages are also included at the end of Volume 2.

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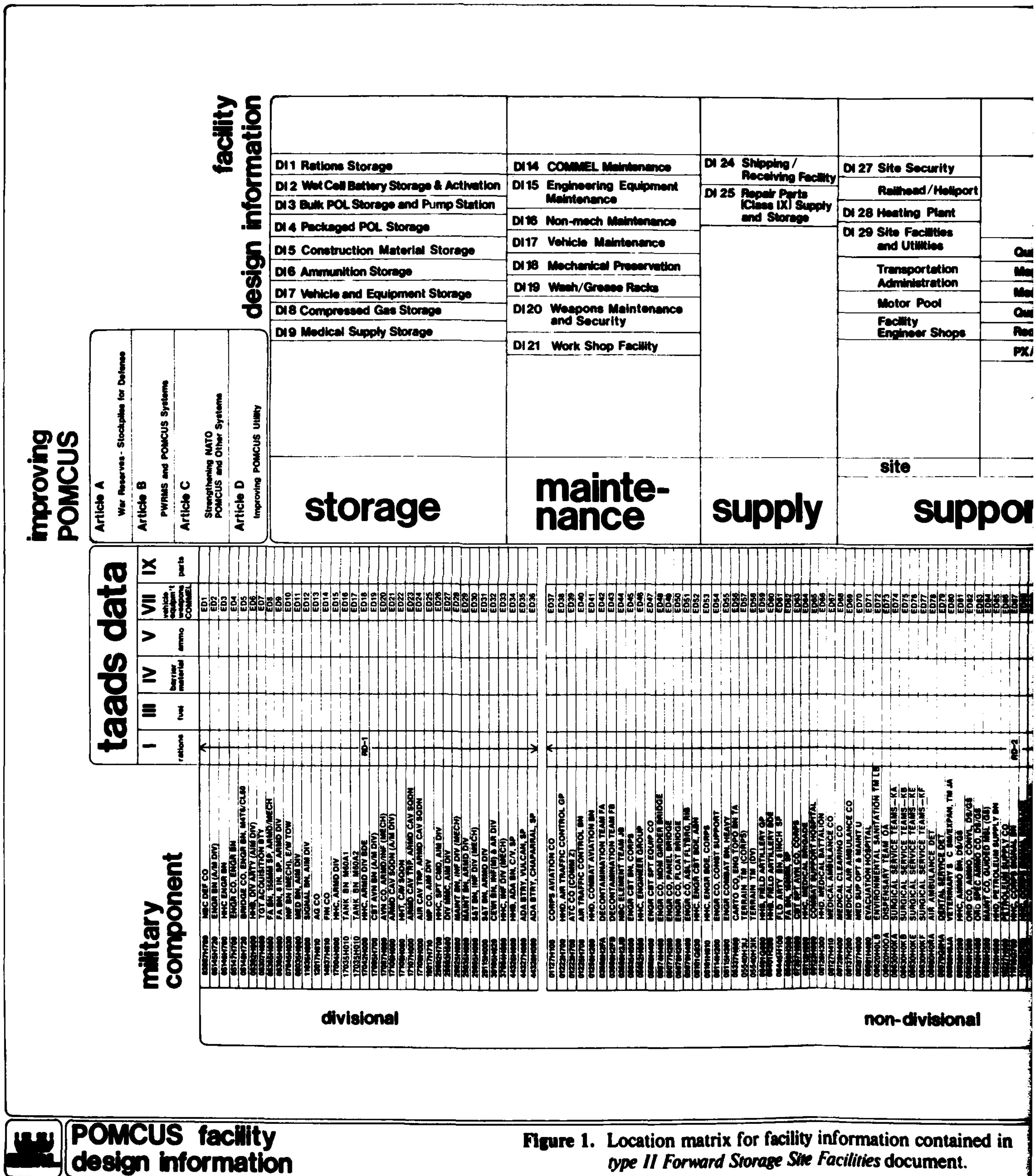


Figure 1. Location matrix for facility information contained in *type II Forward Storage Site Facilities* document.

maintenance	supply	site support	life support	command control	site relationships
…MMEL Maintenance	DI 24 Shipping / Receiving Facility	DI 27 Site Security	Quarters	DI40 CEC Headquarters	DI 45 Site Development
…gineering Equipment …intenance	DI 25 Repair Parts (Class IX) Supply and Storage	Railhead/Heliport	Mess	Communications	DI 46 Site Defense Potential
…n-mech Maintenance		DI 28 Heating Plant	Medical		
…hicle Maintenance		DI 29 Site Facilities and Utilities	Quartermaster		
…chanical Preservation		Transportation Administration	Recreation		
…sh/Grease Racks		Motor Pool	PX/Commisary		
…eapons Maintenance …d Security		Facility Engineer Shops			
…ork Shop Facility					

RD-2

non-divisional

…re 1. Location matrix for facility information contained in
…ype II Forward Storage Site Facilities document.

data locator 6/80

DI 17 ORGANIZATIONAL AND DIRECT SUPPORT MAINTENANCE FACILITY
DESIGN INFORMATION

PURPOSE

7.1 A facility to perform Organizational and Direct Support Maintenance on vehicles and equipment stored at the site and used in operations will be PROVIDED. (2)

ISSUES and ASSUMPTIONS

7.2

a) Number and sizes of maintenance facilities depend on the numbers and types of vehicles and equipment served and will be specifically justified in each case. (2)

b) 5.2 If the primary water supply required to satisfy the above demand is inadequate, or is not available, ground level storage points or open tanks will be PROVIDED. (2)

1. Examination and evaluation of existing structures:

   If existing buildings are being considered for reuse as POMCUS facilities it is necessary to analyse the renovation costs against "new construction" costs. Major costs have been required to make existing buildings responsive to POMCUS activities; especially,

   1) adequate insulation for temperature controlled buildings,

   2) structural adequacy for lift capacities in maintenance facilities.

Figure 2. Two-page format for document extract information.

REQUIREMENTS	CRITERIA
a) 7.2 The facility shall be provided with battery preparation areas with emergency shower and eyewash fountain, tire repair areas, centralized compressed air system, parts storage,lubrication racks, office space, latrines, welding shop, production control offices, locker rooms, shower rooms, and break area. (2)	
b) 7.2 The Facility shall be provided with overhead cranes and vehicle lifts. (2)	b) 7.2 The facility shall be PROVIDED with a 14 metric-ton traveling overhead crane, 18.5 metric-ton vehicle lifts. (2)
c) 7.3 Emergency showers and eyewash are required in the battery room due to the nature of materials being handled and the occasion for severe accidents. (2)	
d) 7.4 Locker rooms and showers shall be PROVIDED. (2)	
e) 7.5 Building shall be PROVIDED with mechanical ventilation in the battery shop and a special automatic exhaust for vehicle emission in the working area. (2)	
f) 7.6 A suitable break area will be PROVIDED. (2)	

GUIDANCE

Figure 2. (Cont'd).

DI 17

OM-1

TRACKED VEHICLE MAINTENANCE BAYS

function/purpose

Meet the Scheduled Service Requirements of Tracked-Based TOE Organizational Units. Common SOP requires all tracked vehicles to be cleaned and serviced at regular intervals and some tracked vehicles to be cleaned and serviced after field operations.

issues and assumptions

1. Scheduled maintenance on tactical equipment can be performed more efficiently and provide for positive pollution control if the proper inclosed facilities and equipment are provided.
2. It is desirable to be able to remove crankcase and transmission oils in tracked equipment with either the power pak in or removed from the vehicle.
3. If an "Oil Analysis Program" were universally established for vehicle crankcase oil, facility impacts would be:
    a. Fewer scheduled maintenance bays would be required.
    b. There would be less depot-level overhaul of power paks.

activities

1. Oil and oil filter changing for wheeled and tracked equipment.
2. Fluid level checks.
3. Radiator flushing for water-cooled engines.
4. Power pak removal.
5. Power pak cleaning.
6. Hull cleaning.
7. Gun tube replacement.
8. Gun tube cleaning.
9. Tire changing.
10. Greasing and lubrication for wheeled and tracked equipment.
11. Ground-hopping of tracked equipment.
12. Power pak replacement.
13. Large component parts cleaning (heatshields, fuel cells, etc.)

personnel

1 to 3 per bay; a function of vehicles scheduled maintenance requirements.

equipment

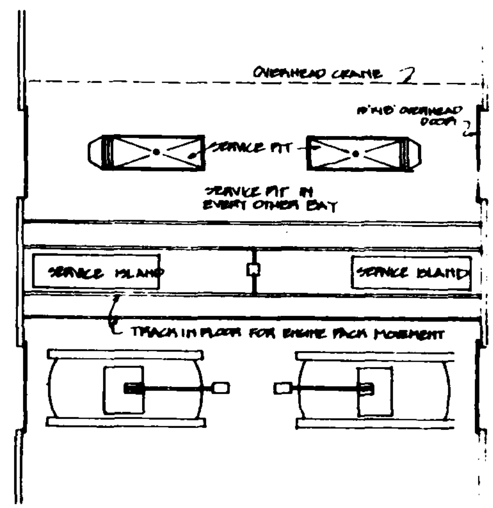
1. Movable sliding waste oil collection funnels side-discharging to waste oil collection trough.
2. Steam/hot water cleaners.
3. Fluid-dispensing system with retractable hoses.
4. Floor jacks, either portable or fixed in floor.
5. Power pak dollies.
6. Solid waste storage cans.
7. Recirculating-solvent small parts washer. (See OM7.)

Figure 3. Two-page format for user/occupant experience information.

requirements	criteria
1. Adequate space to meet the service requirements of many tracked or large wheeled vehicles simultaneously. Service pit at least 2 bays; see OM3.	1. 24 ft. x 40 ft. as basic bay dimensions; see "guidance sketches" for "between" bay areas.
2. Vehicle and personnel access.	2. Bays to have drive-through capability. 15 ft. wide x 20 ft. high vehicle doors to be motorized. Personnel doors to be 3 ft. x 7 ft.
3. Electrical power.	3. 11(/, 220V, 24V DC.
4. Retractable dispensing lines for servicing vehicles.	4. Transmission oil, gear oil, water, compressed air, two grades of lubricating oil, and hydraulic fluid.
5. Wastewater pretreatment with discharge to sanitary sewer.	5. -
6. Waste receptor systems.	6. Solid waste receptacles, waste solvent collection sewer, and waste oil collection to outside underground waste oil storage.
7. Light on all vehicle exterior surfaces.	7. General lighting 300 lux with retractable trouble lights.
8. Two-position vehicle exhaust system at each bay.	8. -
9. Working temperature.	9. 20°C during winter.
10. Lift capability.	10. 18.5 metric ton capacity traveling bridge crane.

guidance

MAINTENANCE BAYS: Typical 4-bay grouping; number of bays is based on the number of tracked vehicles stored.



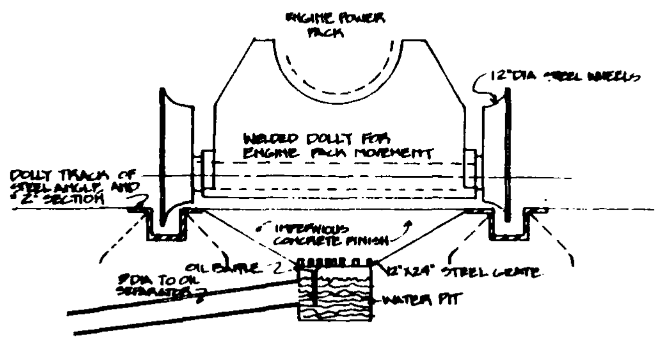


Figure 3. (Cont'd).

facility design information

Storage:

DI 1	Rations Storage (Class I)	1.1
DI 2	Battery Storage and Activation (Class II)	2.1
DI 3	Bulk POL Storage and Pump Station (Class III)	3.1
DI 4	Packaged POL Storage (Class III)	4.1
DI 5	Construction Material Storage (Class IV)	5.1
DI 6	Ammunition Storage (Class V)	6.1
DI 7	Vehicle and Equipment Storage (Class VII)	7.1
DI 8	Compressed Gas Storage (Class VII)	8.1
DI 9	Medical Supply Storage (Class VIII)	9.1

Maintenance:

DI 14	COMMEL Maintenance and Storage	14.1
DI 15	Engineering Equipment Maintenance	15.1
DI 16	Non-mech Maintenance	16.1
DI 17	Vehicle Maintenance	17.1
DI 18	Mechanical Preservation	18.1
DI 19	Wash/Grease Racks	19.1
DI 20	Weapons Maintenance and Security	20.1
DI 21	Workshop Facility	21.1

Supply:

DI 24	Shipping/Receiving Facility	24.1
DI 25	Repair Parts (Class IX) Supply and Storage	25.1

Support:

DI 27	Site Security	27.1
DI 28	Heating Plant	28.1
DI 29	Site Facilities and Utilities	29.1

Command/Control:

DI 40	CEC Headquarters	40.1

Site Relationships:

DI 45	Site Development	45.1
DI 46	Site Defense Potential	46.1

These Existing U.S. Army Documents Related to POMCUS/PWRMS
Design Information are Included as Relevant Extracts
On the Following DI Sheets.

(1)-TM 38-450 "Storage and Maintenance of Prepositioned Material Configured to Unit Sets (POMCUS) - 1971

(1a)-TM 38-450 (draft revision of 1971 edition)

(2)- "NATO Criteria and Technical Standards for Construction of Type II Forward Storage Sites (FSTS) (POMCUS)" -1978

(3)-Rand Study R-2207-PA&E "Vulnerability and Utility of U.S. Army Unit Equipment Prepositioned in Europe (POMCUS)" - October 1977

(4)-Rand Study R-2315-ARPA/ISA/PA&E "Quicker and More Effective Reinforcement of NATO"-June 1978

(5)-HQDA Ltr. "Rapid Reinforcement of NATO/Additional POMCUS and FY80 PWRMS"-Sept 1978

(6)-TM 740-90-1 "Administrative Storage of Equipment"-

(7)-TM 743-200-1 "Storage and Materials Handling"-

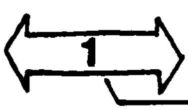
(8) ESC Study "PWRMS and POMCUS System-Managing for Effectiveness in War"-1978

(9)-Article "War Reserves - Stockpiles for Defense" <u>Army Logistician</u>; Vol. 10, Number 1 Jan-Feb 1978

(10)-Background Paper "Strengthening NATO: POMCUS and other Approaches" International Affairs Division of the Congressional Budget Office-Feb. 1979

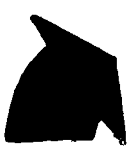
(11)-Information From POMCUS Project Development Participants

LEGEND



required adjacency (importance of relationship)
1 - must be adjacent (usually implies that a door is required)
2 - adjacency preferred

visual access



direct outdoor access

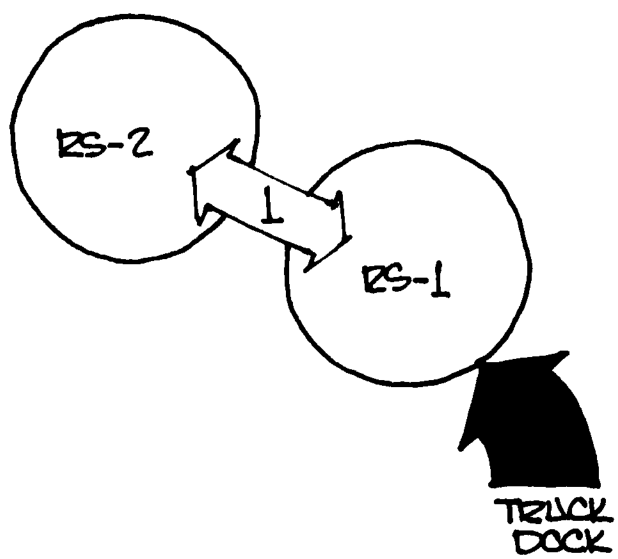
Rations Storage (Class I)

Literature Information

Class I Supplies Storage Facilities 1.2
Controlled Humidity Warehouses 1.6
Stress Tension Structures 1.10

User Information

RS-1 Receiving/Issue 1.12
RS-2 Inventory Control/Storage 1.14



PURPOSE

4.6.1 A building for storage of rations will be PROVIDED for a secured ready supply of meals for combat (MCI). This allows MCI replenishment as needed and allows self sufficiency during active operations. Rations are an essential part of the basic load. (2)

ISSUES and ASSUMPTIONS

4.5.1 The number of warehouses and their size will be specifically justified in each case. An average warehouse gross interior area of 2.4 sq m per metric ton of rations will be PROVIDED. (2)

4.1.1 Rations, Vehicles, COMMO Equipment, other sensitive equipment etc. will be stored in either:

- -Controlled Humidity Storage Structures
- -Individual Flexible Barrier Storage (IFBS)
- -Open Storage (2)

3.1 Covered space is preferred. When sufficient covered space for all items to be stored is not available, priority should be given to items which are most susceptible to deterioration from the elements. SB 38-8-1 should be used as a guide for establishing the items most susceptible to deterioration. (6)

3.1 Open sites should be improved hardstand, if available. Unimproved sites should be firm, well-drained, and kept free of excessive vegetation. (6)

2.5.7.2 Narrow aisle operating equipment will be used to maximum extent practicable to effect reduction in or minimizing of aisle widths. (3)

REQUIREMENTS

a) 4.5.1 Necessary warehouses for CHS shall be PROVIDED. (2)

b) 4.2.1 CHS warehouses will be of semi-permanent type construction providing the controlled humidity storage requirement can be met. (2)

c) 4.2.1 An annex to each warehouse shall be PROVIDED to house dehumidifying equipment. Necessary dehumidifier units will be PROVIDED. (2)

d) 4.6.2 This building shall be PROVIDED with palletized storage racks, configured for the MCI containers. (2)

e) 4.6.2 This building shall have a loading dock and truck parking apron configured for truck and van off-loading and pallet-loader access to the van and into the storage area. (2)

f) 4.6.4 At least two personnel exits shall be PROVIDED at opposite extremes in the building. (2)

CRITERIA

a) 4.5.1 Warehouses will have concrete floors capable of supporting a 5-metric ton wheel load. (2)

f) 4.6.6 The building doors shall be capable of being secured without precluding emergency egress at all times. (2).

GUIDANCE

a) 1.2 For all CHS warehouses and other buildings, austere construction will be employed as far as possible. Austere construction means light prefabricated metal, cement, or cinder block or other low cost nonflammable construction, which will insure sufficient protection against climatic conditions of the site. (2)

b) 1.2 For those materials and supplies which may deteriorate or be damaged if stocked in the open, roofed open storage or controlled humidity storage shall be PROVIDED. (2)

c) 4.6.3 This building shall be a metal prefab building with removable interior metal liner, PROVIDED with a heating and ventilating system to maintain temperatures between 1°C and 5°C and a relative humidity of less than 50% at all times. Wall and roof thermal insulation shall be PROVIDED. (2)

REQUIREMENTS

g) 4.6.7 Combination hot and cold water hose bibbs shall be PROVIDED. (2)

h) 1.2 Class I,II,IV, VII, VIII, IX. Open storage areas will be PROVIDED for all material and supply which may be stored in the open. (2)

i) 3.5 The lighting system shall provide minimum illumination intensities as follows: (2)

j) 4.6.5 A wet pipe sprinkler system shall be PROVIDED to protect the contents.

k) 2.5.7.3 As a means of contributing to storage regularity and also to provide a desirable safety factor, warehouse aisle boundaries will be clearly identified by painted stripes. (3)

CRITERIA

g) 4.6.7 They shall be located at each wall to allow periodic washdowns.(2)

h) 1.2 Open storage areas will consist of hardstands. (2)

i) 3.5.1 100 lux inside warehouses and storage buildings, measured at floor level. (2)

k) 2.5.7.3 The width of these stripes will not exceed 4 inches nor be reduced below 3 inches, and will be consistent throughout an installation's warehouses. White Gloss No. 17875, as identified in Federal Standard TT-C-595, and as required by AR 385-30 will be used for this purpose. Paint will conform to Federal Specification TT-P-115, Paint, Traffic, Highway. (3)

GUIDANCE

NOTES

PURPOSE

ISSUES and ASSUMPTIONS

For those materials and supplies which may deteriorate or be damaged if stocked in the open, roofed open storage or controlled humidity storage will be PROVIDED. (2)

3.10.2.1 In high humidity environment, conventional storage facilities do not afford adequate protection to certain types of supplies preserved Level C against damage and deterioration that can result from excessive humidity. This is particularly applicable where supplies are to remain in storage for extended periods. To insure that the capability of material to perform its intended function will not be impaired or that supplies will not become unfit for consumption as a result of exposure to excessive humidity, methods have been developed to provide control of humidity within storage warehouses. (7)

3.10.7.10.2 Where battery-powered equipment cannot be or is impracticable to obtain or use in controlled humidity storage, gasoline-engine-powered equipment can be used with certain precautions. In use of such equipment, certain factors must be considered. (7)

3.10.7.10.2.2 When utilizing engine-driven materials handling equipment in controlled humidity warehouses, any concentration of carbon monoxide gas which exceeds 100 parts of carbon monoxide per 1,000,000 parts of air must be prevented. (7)

3.10.3.3 The modern, permanent warehouses (WW II and later) are preferred for the storage of current distribution stocks. These warehouses will be converted to controlled humidity space (by section or complete warehouse) as required and permitted by available funds. (7)

3.10.3.5 Sections of warehouses used exclusively for shipping, receiving, and box shop operations normally will not be converted to controlled humidity space. (7)

3.10.3.6 Considering cost of installation and continuing cost of operation, controlled humidity space can be installed most economically in permanent and standard portable frame warehouses, such as: (7)

3.10.3.6.1 Permanent-type standard warehouses constructed since 1950, 200'X 1000', built-up roof, concrete roof decking with steel framing or laminated wood roof framing, block or brick side walls and dock level floors. (7)

3.10.3.6.2 Permanent-type warehouses, gabled roof with steel framing; block or tile walls, windows, and louvers. (7)

3.10.3.6.3 Permanent type warehouses constructed between 1940 and 1950, 180'x1440' (or multiples of 240' sections), with monitor in center third of roof, block or brick side walls, and dock level floor. (7)

ISSUES and ASSUMPTIONS

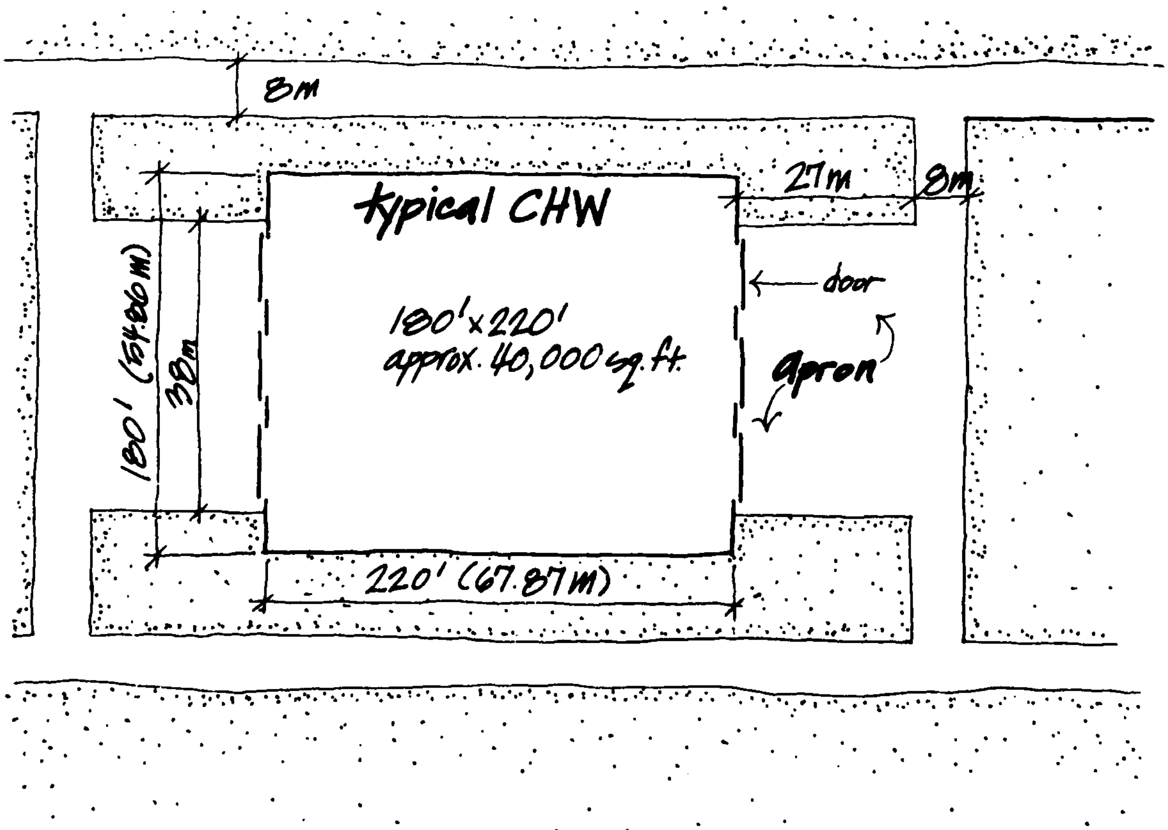
1. Examination and evaluation of existing structures (11):

If existing buildings are being considered for reuse as POMCUS facilities, it is necessary to analyze the renovation costs against "new construction" costs. Major costs have been required to make existing buildings responsive to POMCUS activities; especially,

1) control of numid air infiltration into CHW at existing openings,
2) adequate insulation for temperature controlled buildings,

Roads per CHW:	500mx8m=4000m^2
Turnpad per CHW:	1 @ 10mx20m=200m^2
Aprons (2 per CHW):	1=38mx27m=1026m^2 each, or 2052m^2 per CHW

TOTAL per CHW=6252m^2



REQUIREMENTS

a. 4.2.1 CHS warehouses will be of temporary type construction providing the controlled humidity storage requirement can be met. (2)

b. 4.2.1 An annex to each warehouse will be PROVIDED to house dehumidifying equipment. Necessary dehumidifier units will be PROVIDED. (2)

c. 3.10.3.1 Controlled humidity storage space should be provided for areas where the outdoor relative humidity is 40 percent or above for more than 50 percent of the total time. (7)

d. 3.10.7.1 Controlled humidity equipment should be located within the warehouse so as not to obstruct traffic aisles. (7)

e. 3.10.7.2 It is essential that the entrance of humid air into controlled humidity warehouses be kept to the minimum in order to maintain the relative humidity at desired level. Door control is of paramount importance, since the greatest source of moisture penetration is through open doors. An alarm system may be provided to signal open doors. (7)

CRITERIA

a. 3.10.3.2 Equipment for the control of humidity in storage space will be operated so as to maintain 40 percent relative humidity (RH). (3)

GUIDANCE

1.2

For all CHS warehouses and other buildings, austere construction will be employed as far as possible. Austere construction means light prefabricated metal, cement, or cinder block or other low cost nonflammable construction, which will insure sufficient protection against climatic conditions of the site. (2)

NOTES

PURPOSE

4.2.2 Stress Tension Structures (STS) can be used as warehouses for controlled or uncontrolled humidity storage. They can provide economical storage space for a wide variety of items. (2)

ISSUES and ASSUMPTIONS

4.2.2.1 When STS are used for storage in Type II Forward Storage Sites (FSTS), they shall have a 10 to 12-year life expectancy and will be replaced upon termination of structure life. (2)

When STS facilities are considered to be Real Property (rather than as a "relocatable structures"), OM&A funding for continuing maintenance should be considered.

REQUIREMENTS

a. 4.2.2.1 STS are used for storage in Type II Forward Storage Sites (FSTS), the structures themselves and all lighting, heating, and humidity control equipment shall be PROVIDED. (2)

b. 4.2.2.1 Concrete floor slab, foundation, and all utilities connections shall be PROVIDED. (2)

c. 4.2.2.2 Each STS shall be PROVIDED with two personnel doors. (2)

d. 4.2.2.2 Each STS shall be PROVIDED with two vehicle access doors. (2)

e. 4.2.2.2 Each STS shall be PROVIDED with a flexible pavement access apron. (2)

CRITERIA

GUIDANCE

DI
1

RS-1
RECEIVING/ISSUE

function/purpose

To receive for storage, and to issue for use, rations and supplies.

issues and assumptions

activities	personnel	equipment
1. Receive or issue supplies.		1. Desk with chair. 2. File space.

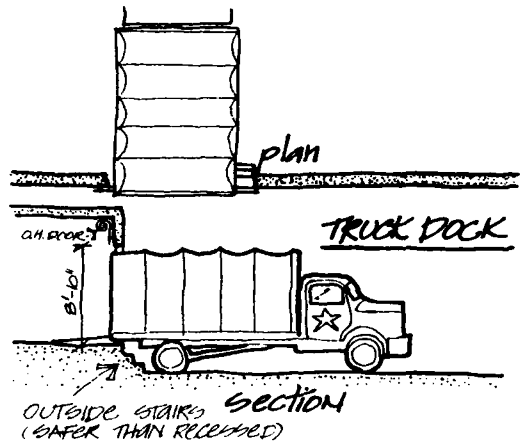
requirements

1. Adequate lighting.
2. Durable floors.
3. Truck dock.

criteria

1. 100 lux measured at the floor.
2. Concrete capable of supporting a 5 M-ton wheel load.

guidance



DI
1

RS-2

INVENTORY CONTROL/STORAGE

function/purpose

To store and inventory rations and supplies.

issues and assumptions

1. Storage capacity calculations:

$$\frac{\text{(personnel strength)} \times \text{(3 meals/day)} \times \text{(3 days supply)}}{12} = \text{\#cases} \quad \text{@25 pounds/case}$$

1 pallet=48 cases
1 pallet=4'x4' with 4" overhand=16 sq. ft.
pallets to be stacked 4 high

activities

1. Store rations.
2. Inventory supplies.

personnel

equipment

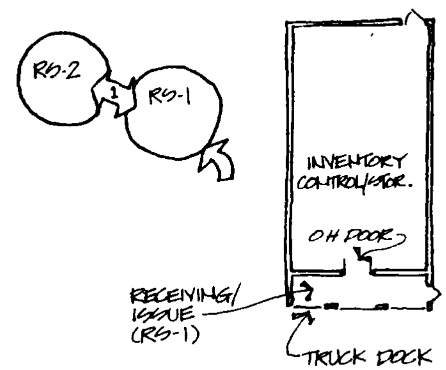
1. Palletized storage racks.

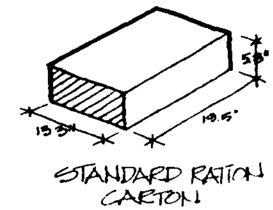
requirements	criteria
1. Fire control.	1. Wet-pipe sprinkler system.
2. Hot and cold water.	2. Combination hot and cold hose bibbs.
3. Adequate lighting.	3. 100 lux measured at floor.
4. Durable flooring.	4. Concrete capable of supporting a 5 M-ton wheel load.
5. Personnel access.	5. At least two exits capable of being secured without precluding emergency egress.
6. Humidity control.	6. 50 percent relative humidity at all times.
7. Heating, ventilation, and cooling.	7. Temperatures between $1^{\circ}C$. and $5^{\circ}C$.

guidance

"B" Rations (1 day [3 meals]/man) each: wt. = 3.792 lb.
cube = 0.1164 cu. ft.
(This is the "summated average" of several different boxes.)

"C" Rations (1 day [3 meals])/man) 12/case: wt. 25.0 lb.
cube = .80 cu. ft.





1. "C" rations are boxed in standard cartons: length 19.5 in., width 13.3 in., height 5.3 in.

2. "B" rations are boxed in many different cartons. Volumes indicated are composite averages.

3. A 3-day supply of "C" rations only is stored at CEGE/POMCUS sites.

4. Current practice is to allocate a 3-day supply for a full complement of personnel.

5. It is essential that the entrance of humid air into controlled-humidity warehouses be minimized in order to maintain the relative humidity at the desired level. Door control is of paramount importance, since the greatest source of moisture penetration is through open doors. An alarm system may be provided to signal open doors.

6. As a means of contributing to storage regularity and also to provide a desirable safety factor, warehouse aisle boundaries will be clearly identified by painted stripes. The width of these stripes will not exceed 4 in. nor be reduced below 2 in., and will be consistent throughout an installation's warehouses. White Gloss No. 17875, as identified in Federal Standard TT-C-595, and as required by AR 385-30, will be used for this purpose. Paint will conform to Federal Specification TT-P-115, Paint, Traffic, Highway.

NOTES

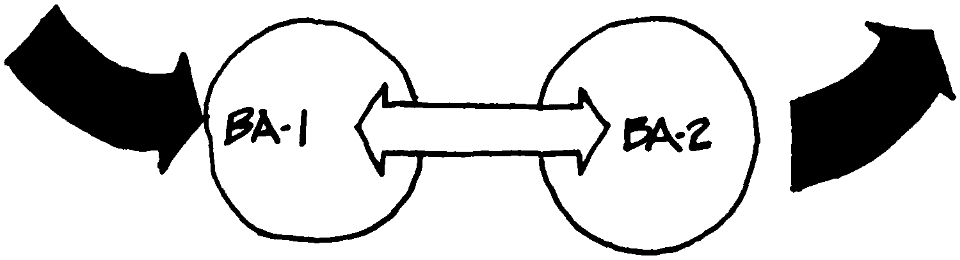
Battery Storage & Activation (Class II)

Literature Information

Class II Supplies Storage Facilities:
Battery Activation Facility 2.2

User Information

BA-1 Battery Storage 2.6
BA-2 Battery Activation and Issue 2.8



PURPOSE

4.7.2.2 A function of this facility is to provide initial charge by addition of stored electrolyte, to all batteries. (2)

ISSUES and ASSUMPTIONS

3.1 Covered space is preferred. When sufficient covered space for all items to be stored is not available, priority should be given to items which are most susceptible to deterioration from the elements. SB 38-8-1 should be used as a guide for establishing the items most susceptible to deterioration. (6)

3.1 Open sites should be improved hardstand, if available. Unimproved sites should be firm, well-drained, and kept free of excessive vegetation. (6)

2.5.7.2 Narrow aisle operating equipment will be used to maximum extent practicable to effect reduction in or minimizing of aisle widths. (3)

4.7.2.3.6 Space requirements for storage of battery fluids and acid quantities to be determined by number of vehicles to be supported. (2)

REQUIREMENTS

a) 4.7.2.1 A battery activation facility shall be PROVIDED to store acid batteries in a dry condition and provide facilities for activation of those batteries for use. (2)

b) 4.7.2.3 As part of this facility, the following shall be PROVIDED: (2)

c) 4.7.2.3.1 A clay sink for filling batteries with electrolyte. (2)

d) 4.7.2.3.2 Battery charging rack(s). (2)

e) 4.7.2.3.3 An emergency shower and eye-wash. (2)

f) 4.7.2.3.4 Mechanical ventilation, heating, and lighting. (2)

g) 4.7.2.3.5 Cold water outlets and hose bibbs, facilities for neutralizing all acid waste drainage and an automatic fire alarm and extinguishing system. (2)

h) 4.7.2.3.6 Storage space for battery fluids. (2)

i) 3.5 The lighting system shall provide minimum illumination intensities as follows: (2)

CRITERIA

d) 4.7.2.3.2 Charging racks shall be in a separate room with one hour fire separation walls and mechanical exhaust fan, with a minimum of 10 air changes per hour. (2)

i) 3.5.1 100 lux inside warehouses and storage buildings, measured at floor level. (2)

GUIDANCE

REQUIREMENTS

j) 2.5.7.3 As a means of contributing to storage regularity and also to provide a desirable safety factor, warehouse aisle boundaries will be clearly identified by painted stripes. (3)

CRITERIA

i) 3.5.3 5 lux outside of all storage and administrative buildings at midpoint of lower edge of each door only. (2)

j) 2.5.7.3 The width of these stripes will not exceed 4 inches nor be reduced below 3 inches, and will be consistent throughout an installation's warehouses. White Gloss No. 17875, as identified in Federal Standard TT-C-595, and as required by AR 385-30 will be used for this purpose. Paint will conform to Federal Specification TT-P-115, Paint, Traffic, Highway. (3)

GUIDANCE

NOTES

DI 2

BA-1
BATTERY STORAGE

function/purpose

Stock and store supply.

issues and assumptions

activities

1. Receive.
2. Store as battery type.
3. Electrolyte.

personnel

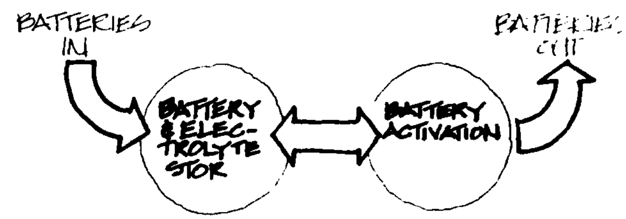
1 - local national.

equipment

1. Forklift.
2. Warehouse battery carts.

requirements	criteria
1. Loading dock.	1. 3 ft., 10 in. high.
2. Conveyor to activation counter.	2. See Guidance.
3. Adequate space.	3. Approximately 400 sq. ft.
4. Adequate lighting.	4. 500-lux fluorescent or incandescent lamps in corrosion-proof fixtures. IES standard for storage rooms for both "active" and "medium" classifications.
5. Ventilation	5. 10 CFM

guidance



DI 2

BA-2

BATTERY ACTIVATION AND ISSUE

function/purpose

To activate wet cell batteries and issue batteries during REFORGER exercises and mobilization.

issues and assumptions

1. Time. Current operations and equipment require 60 hours to finish all battery activation for a typical mobilization exercise. This condition should be improved with more efficient techniques, equipment, and facilities.

2. Battery location. Batteries are now stored in CHW in their vehicles and are filled at an issue process with a 500 gallon activation device. (see DI-7, page 7-15)

3. Storage Calculations:

   Battery densities (end item density provided by ACSLDG)

Item	Avg. # Btry
Wheels	2
Tracks	4
Heavy Eng	4
Lt. Eng	2
Arty	4

1 battery=1sf X # of batteries ÷ stack 2 high per pallet ÷ 4 pallets high
m^2 req. = sq. ft. req'd ÷ 10.76
75m^2 required for activation area
total required = 75m^2 + m^2 req'd

activities

1. Uncrate batteries.
2. Uncap and punch cells.
3. Fill batteries with electrolyte.
4. Wash batteries.

personnel

Advance personnel of Army units.

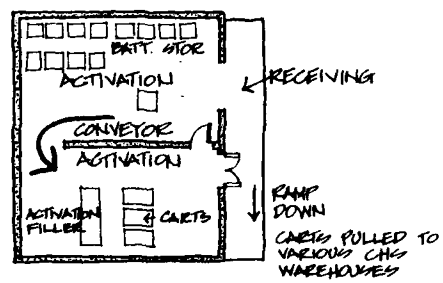
equipment

1. Uncrating hand tools.
2. Electrolyte filler unit.
3. Warehouse battery carts.
4. Battery chargers with cables.

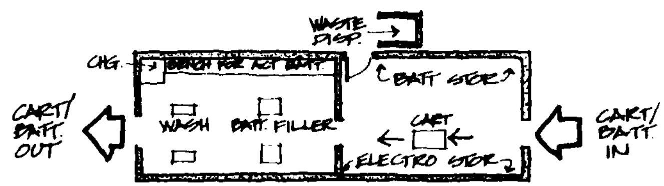
requirements	criteria
1. Adequate space.	1. Approximately 600 sq. ft.
2. Power.	2. 110V to power charger(s). Spark-resisting devices for all electrical items.
3. Water.	3. Cold water line.
4. Sanitary sewer in floor.	4. Fabricated with acid-resistant piping materials.
5. Adequate lighting.	5. 500-lux fluorescent or incandescent lamps in corrosion-proof fixtures.
6. Thermal comfort.	6. $20^{0}C$ during winter.
7. Exhaust ventilation; separate system to outside.	7. 10 air changes per hour. Interlock must be provided to de-energize charging circuits if ventilation fails or is shut down.
8. Sink with acid-resistant surface and faucet.	8. -
9. Emergency shower (see Guidance).	9. Within 25 ft. of work area.
10. Emergency eyewash fountain.	10. Within 25 ft. of work area.
11. Fire extinguishers.	11. -
12. Material-handling equipment.	12. Carboy. (All motors are to be explosion-proof. All fixtures and switches are to be class II.)
13. Durable flooring.	13. Acid-resistant finish on concrete.

guidance

1. "No Smoking" signs.
2. Receptacles located above charging racks.
3. Racks and other metal equipment should be coated (or covered) to prevent spark generation and should be acid-resistant.



BATTERY SHOP WITH DOCK



DRIVE THRU BATTERY SHOP

NOTES

Bulk POL Storage & Pump Station [Class III]

Literature Information

Class III Supplies Storage Facilities:
Bulk POL Facility 3.2
POL Storage/Pump Station 3.6

User Information

BP-1 Bulk POL Storage and Pump Station 3.10
BP-2 Pump Station 3.12
Fuel/Defuel Pads
(See PM-8, page 18.26)

PURPOSE

4.8.1 Facilities for separate storage of diesel, mogas, and lubricating oils will be PROVIDED. This will include all installations necessary to meet daily operational requirements and to enable a fuel-up of all vehicles stored at the site before their deployment. (2)
4.8.2.1 The Bulk POL Facility is needed in order to fuel all vehicles located at the site before their combat deployment. (2)

ISSUES and ASSUMPTIONS

a. 1.3.1 Bulk storage shall be PROVIDED in order to meet contingency and daily operational requirements. (2)

REQUIREMENTS

a) 4.8.2.1 The facility shall be PROVIDED with concrete fueling pads and earthwork diking to accommodate collapsible fuel tanks. (2)

b) 4.8.2.2 The pads shall be PROVIDED with POL separators. (2)

c) 4.8.2.3 The collapsible tanks and all other equipment necessary for the functioning of this facility shall be REQUIRED. Facilities for the storage of these collapsible tanks and other related equipment shall be PROVIDED. (2)

d) 3.5 The lighting system shall provide minimum illumination intensities as follows: (2)

e) 1.10 In areas of flammable storage of such materials as POL petroleum products or other materials which would not be suited to fire extinguishment by water, dry-chemical or CO_2 system or extinguishers shall be PROVIDED. (2)

f) 1.11 All POL storage areas shall be provided with either curbs or depressed slab for POL containment and shall include POL separators.(2)

CRITERIA

b) 1.2 Oil separators will have a net capacity of 2.50 liters for each square meter of surface to be drained. (2)

d) 3.5.4 50 lux at all outside storage areas, fueling points, work areas, and loading docks to allow for 24-hour operation of the site. (2)

GUIDANCE

REQUIREMENTS

g) 1.12 In areas of POL, bottled gas storage, or any potentially fire hazardous areas, explosion proof wiring and fixtures shall be PROVIDED, along with adequate ventilation system. (2)

CRITERIA

GUIDANCE

NOTES

PURPOSE

4.8.3.1 A facility shall be PROVIDED to meet the normal daily fuel consumption needs of the facility for operation of vehicles and equipment.(2)

ISSUES and ASSUMPTIONS

1.3.2 Also PROVIDED is a pump station to provide for the daily administrative fuel consumption needs of the facility. (2)

REQUIREMENTS

a) 4.8.3.2 This facility consists of two fuel pumps, one for diesel fuel and one for mogas, installed on a concrete island and supported on isolated footings, with safety barricades at each end. (2)

b) 4.8.3.3 Necessary fire-fighting equipment shall be REQUIRED. (2)

c) 4.8.3.4 An emergency shower and eyewash shall be PROVIDED. (2)

d) 4.8.3.5 The facility shall be provided with drains to contain all run-off from the facility and pass it through a POL separator before discharge into the sewer system. (2)

e) 4.8.3.6 A shelter for attendants operating the facility shall be PROVIDED. (2)

f) 3.5 The lighting system shall provide minimum illumination intensities as follows: (2)

g) 1.10 In areas of flammable storage of such materials as POL petroleum products or other materials which would not be suited to fire extinguishment by water, dry-chemical or CO_2 system or extinguishers shall be PROVIDED. (2)

CRITERIA

a) 4.8.3.2 A total storage capacity of 76,000 liters of fuel will be provided. (2)

d) 1.2 Oil separators will have a net capacity of 2.50 liters for each square meter of surface to be drained. (2)

e) 4.8.3.6 The facility shall have a gross interior area of 10 sq m contain a latrine and heating. (2)

f) 3.5.4 50 lux at all outside storage areas, fueling points, work areas, and loading docks to allow for 24-hour operation of the site. (2)

GUIDANCE

REQUIREMENTS

h) 1.11 All POL storage areas shall be provided with either curbs or depressed slab for POL containment and shall include POL separators.(2)

i) 1.12 In areas of POL, bottled gas storage, or any potentially fire hazardous areas, explosion proof wiring and fixtures shall be PROVIDED, along with adequate ventilation system. (2)

CRITERIA

GUIDANCE

NOTES

DI 3

BP-1
BULK POL STORAGE

function/purpose

Separate storage of diesel and mogas necessary to enable a fuel-up of all vehicles stored at the site before their deployment.

issues and assumptions

1. All vehicles will have a full fuel system when they leave the site during a mobilization.

2. The issue fuel will be brought to the site by tankers and transferred to collapsible bladders.

3. Tankers will be used at the CHWs to fuel as many vehicles as possible, in order to expedite issue flow.

4. Storage Calculations: 2 pads, one diesel, one mogas, each 1100 m^2. Each pad to handle 2-10,000 gal. bladders. ISSP has pump and hoses.

Unit vehicle types and numbers of each are used to obtain computer-generated amounts of all fuel types based upon desired extent of fuel supply. Different quanities would be generated based upon different assumed conditions, i.e.: 1) distance all vehicles must travel after leaving the CEGE site--50 km, 100 km, etc, 2) a standard percentage of all fuel tank capacities--25%, 50% full, all filled, or 3) average day(s) supply--1 or 2 day convoy conditions.

Other bulk fuel quantities can be similarly obtained for the known CEGE site Units for both cooking and space heating purposes.

activities

1. Storage of bulk products.

personnel

equipment

1. 1 - fuel system, supply point.
2. 1 - collapsible fabric-tank repair kit.
3. 3 - 500-gal. collapsible drums.
4. 3 - pressure control for filling nonvented drums.
5. 1 - 500-gal. collapsible drum tiedown kit.
6. 2 - 500-gal. collapsible drum towing and lifting yokes.
7. 4 - 500-gal. collapsible tanks.
8. 8 - 350-gpm pumping assemblies.
9. 1 - fuel-handling hoseline outfit (assault hoseline).
10. 1 - electric floodlight set.
11. 1 - gas engine generator (5 kw).
12. 1 - FARE system.

requirements

1. Adequate space **Tank dimensions, feet.**
2. Lighting.
3. Hardstand.
4. Access roads.
5. Distances between components of the fuel system supply point.

From	To	Feet
Receiving manifold	Receiving pump	60
Receiving pump	Manifold on first tank	60
10,000-gallon tank	10,000-gallon tank	40
Manifold on last tank	Discharge pump	60
Discharge pump	Filter/separator	40
Filter/separators	First fuel-servicing nozzle	60
Fuel-servicing nozzle	*Fuel-servicing nozzle*	25
Last fuel-servicing nozzle	First 500-gallon drum-filling point	75
500-gallon drum-filling point	500-gallon drum-filling point	50
Last 500-gallon drum-filling point	First bottom-loading point	75
Bottom-loading point	Bottom-loading point	75

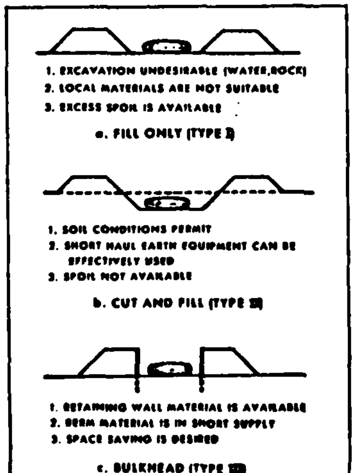
6. Containment berms.

criteria

1.

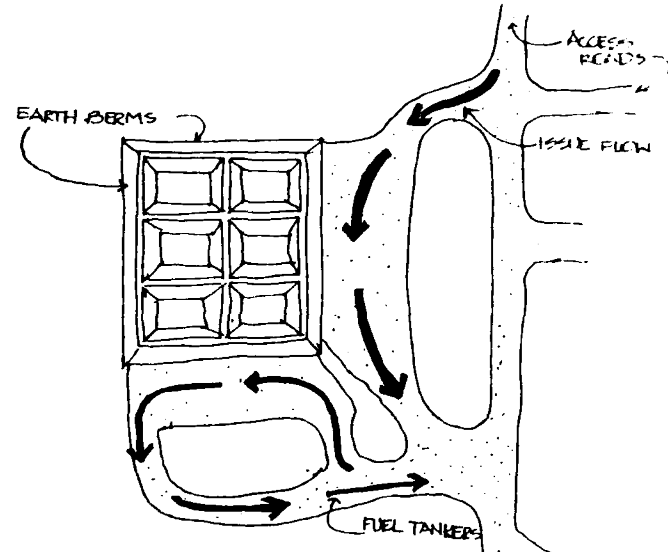
50,000-gallon flexible tank	10,000-gallon flexible tank
5½ by 24 by 68	4 by 22 by 22

2. 50 lux.
3. Concrete.
4. -
5.
6.

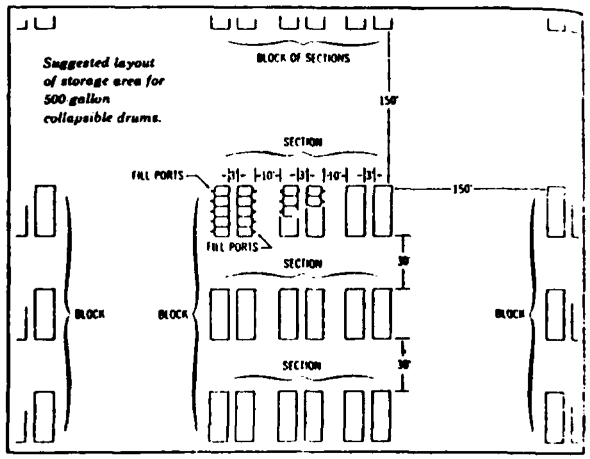


BERM TYPES

guidance



TYPICAL BULK POL STORAGE



Suggested layout of storage area for 500 gallon collapsible drums.

DI 3

BP-2 PUMP STATION

function/purpose

Separate storage of diesel, mogas, and lubricating oils necessary to meet daily operational requirements.

issues and assumptions

1. Separate fuel storage provided for issue and fuel storage required for daily operations.

activities

1. Fuel vehicles for daily operations.

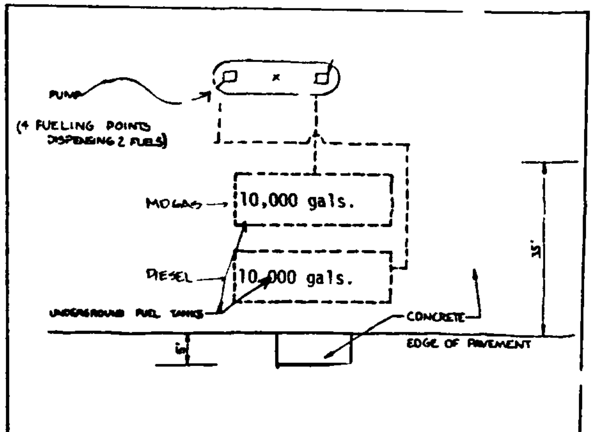
personnel

equipment

1. 2 underground tanks (1 for diesel, 1 for mogas).
2. 2-pump pumping station.

requirements	criteria
1. Adequate size	1. See guidance
2. Lighting	2. 50 LUX
3. Hardstand	3. Concrete
4. Access roads	4. ----

guidance



FUEL DISPENSING FACILITIES

NOTES

Packaged POL Storage (Class III)

Literature Information

Class III Supplies Storage Facilities:
Packaged POL Storage — 4.2

User Information

PP-1 Packaged POL Storage — 4.6

PURPOSE 4.8.5.1 Packaged POL storage facility shall be PROVIDED for the storage of lube oils, grease, brake fluid, transmission fluid, anti-freeze, and other products used in the daily operation and maintenance of diesel and gasoline powered vehicles and their associated equipment and tool and pre-positioned stocks. Facility shall also store this material for issue as part of the basic load to be issued upon combat deployment of units. (2)

ISSUES and ASSUMPTIONS

a) 4.8.5.1 This building shall be sized according to the quantity of products required by the basic load which varies at each site, and shall have a flexible pavement service apron necessary to sustain warehouse operation by various retrieval vehicles including pallet-loaders. (2)

REQUIREMENTS

a) 4.8.5.2 The interior shall be PROVIDED with metal shelving and 55 gallon drum racks. (2)

b) 4.8.5.3 The building shall be PROVIDED with adequate ventilation, necessary security and fire protection as required by local laws. (2)

c) 4.8.5.4.1 POL separators on all drainage areas or hardstand area upon which this building is placed. (2)

d) 4.8.5.4.3 A hose bibb shall be located near each of these structures for washdown purposes, together with an emergency eyewash. (2)

e) 4.8.5.4.2 A portable dry chemical fire extinguisher. (2)

f) 3.5 The lighting system shall provide minimum illumination intensities as follows: (2)

CRITERIA

c) 1.2 Oil separators will have a net capacity of 2.50 liters for each square meter of surface to be drained. (2)

d) 4.8.5.3 The hose bibb shall be located within 8m of each of these structures.

f) 3.5.1 100 lux inside warehouses and storage buildings, measured at floor level.

f) 5 lux outside of all storage and administrative buildings at mid-point of lower edge of each door. (2)

GUIDANCE

REQUIREMENTS

g) 1.10 In areas of flammable storage of such materials as POL petroleum products or other materials which would not be suited to fire extinguishment by water, dry-chemical or CO_2 system or extinguishers shall be PROVIDED. (2)

h) 1.11 All POL storage area shall be provided with either curbs or depressed slab for POL containment and shall include POL separators. (2)

i) 1.12 In areas of POL, bottled gas storage, or any potentially fire hazardous areas, explosion proof wiring and fixtures shall be PROVIDED, along with adequate ventilation system. (2)

CRITERIA

g) 4.8.5.4.2 A portable dry-chemical fire extinguisher shall be readily accessible at each of these structures. (2)

GUIDANCE

NOTES

DI 4

PP-1

PACKAGED POL STORAGE

function/purpose

To store lube oils, grease, brake fluid, transmission fluid, anti-freeze, and other packaged products.

issues and assumptions

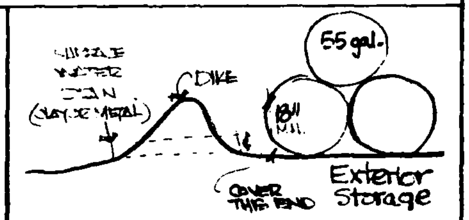
Storage Calculations:

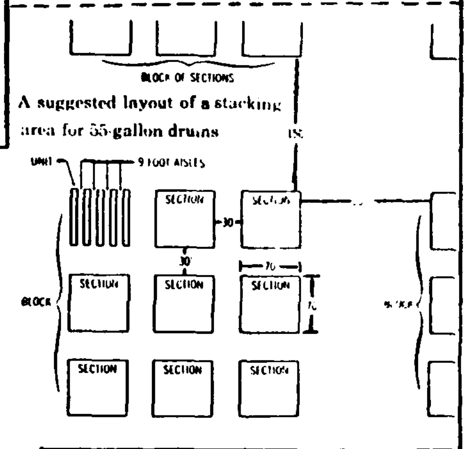
Requirements taken from CRITERIA.

Packaged POL products issued to units for REFORGER are delivered to either the issue site or Marshalling Area by the supporting area supply and service company. The amounts of each product varies with type of unit set. Stocks must be rotated ("first in, first out"), and inspected annually to ascertain any package deterioration.

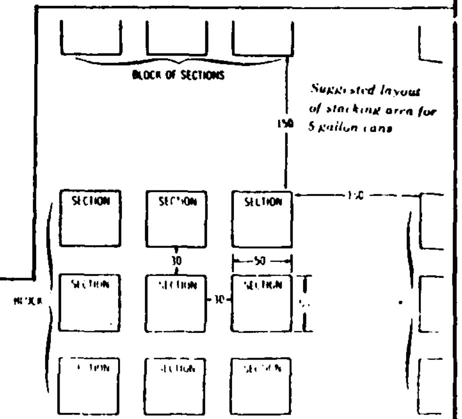
activities	personnel	equipment
1. Drum and can filling.		
2. Store 55-gal. drummed products.		
3. Store products in 5-gal. containers.		

requirements	criteria	guidance
1. Adequate space. 2. Ventilation. 3. Water supply and waste. 4. Durable, non-porous flooring. 5. No places where vapors or spills can collect.	1. - 2. If natural ventilation is not sufficient, upward-directed fans with outlet no less than 10 ft. above an adjacent opening into a building, and preferably, 20 ft. above the surrounding grade. 3. Hose outlet and trapped drains. 4. No wood flooring. 5. No lower ground area, pits, or basements.	
OUTDOOR STORAGE 1. Adequate length and width of storage area. COVERED STORAGE 1. Fire-resistant materials. 2. Overhead clearance to allow stacking materials to a height of 12 ft. 3. Durable flooring. 4. Water distribution in case of fire. 5. Storage areas planned to allow segregation of products into sections. 6. Aisle space adequate for inspection and firefighting. 7. Isolate spillage. 8. Roadways and parking space within warehouse area.	1. - 2. - 3. Concrete floor. 4. Overhead sprinkler system. 5. - 6. - 7. Curbs around each section of containers.	
1. Adequate space.	1. 50 ft. x 50 ft. each 14,032-can section (if pyramid) or pallet section.	





A suggested layout of a stacking area for 55-gallon drums



Suggested layout of stacking area for 5 gallon cans

NOTES

Construction Material Storage [Class IV]

Literature Information

Class IV Supplies Storage Facilities 5.2

User Information

CM-1 Construction Material Storage 5.6

PURPOSE

ISSUES and ASSUMPTIONS

a. 1.2 Class I, II, IV, VII, VIII, IX. Open storage areas will be PROVIDED for all material and supplies which may be stored in the open. (2)

b. 4.9.2 These are essential combat items. The amount of material to be stored shall be determined by the type and number of UICs (basic load) accommodated at the facility. (2)

c. 3.1 Covered space is preferred. When sufficient covered space for all items to be stored is not available, priority should be given to items which are most susceptible to deterioration from the elements. SB-38-8-1 should be used as a guide for establishing the items most susceptible to deterioration. (6)

d. 3.1 Open sites should be improved hardstand, if available. Unimproved sites should be firm, well-drained, and kept free of excessive vegetation. (6)

2.5.7.2 Narrow aisle operating equipment will be used to maximum extent practicable to effect reduction in or minimizing of aisle widths. (3)

REQUIREMENTS

a) 1.2 For those materials and supplies which may deteriorate or be damaged if stocked in the open, roofed open storage or controlled humidity storage shall be PROVIDED. (2)

b) 4.9.2 Covered barrier material storage shall be PROVIDED for storage of barbed wire and barbed tape and related barrier material for security usage. (2)

c) 4.9.1 Covered or open storage shall be PROVIDED. (2)

d) 1.2 Open storage areas will consist of hardstands. (2)

CRITERIA

a) 4.9.3 Building shall be a 3-sided, covered, exterior floodlight illuminated, but unheated shed. The floor shall be of asphaltic concrete to allow fork lift operation and will have a drainage system. (2)

c) 4.9.1 1.5 sq m per ton of gross interior area for covered storage and 2.5 sq m per ton for open storage will be used. (2)

d) 7.3 Hardstands shall be constructed of rigid pavement.

GUIDANCE

DESIGN INFORMATION

REQUIREMENTS

e) 3.5 The lighting system shall provide minimum illumination intensities as follows: (2)

f) 3.5.5 Area lighting will be provided on all buildings, loading ramps, washracks, grease racks, IFBS areas, exterior storage and work areas for night operations. (2)

g) 2.5.7.3 As a means of contributing to storage regularity and also to provide a desirable safety factor, warehouse aisle boundaries will be clearly identified by painted stripes. (3)

CRITERIA

e) 3.5.1 100 lux inside warehouses and storage buildings, measured at floor level. (2)

f) 3.5.3 5 lux outside of all storage and administrative buildings at midpoint of lower edge of each door only and around the perimeter of open storage areas for routine security. (2)

f) 3.5.4 50 lux at all outside storage areas, fueling points, work areas, and loading docks to allow 24-hour operation of the site. (2)

g) 2.5.7.3 The width of these stripes will not exceed 4 inches nor be reduced below 3 inches, and will be consistent throughout an installation's warehouses. White Gloss No. 17875, as identified in Federal Standard TT-C-595, and as required by AR 385-30 will be used for this purpose. Paint will conform to Federal Specification TT-P-115, Paint, Traffic, Highway. (3)

GUIDANCE

NOTES

DI 5

CM-1

CONSTRUCTION MATERIAL STORAGE

function/purpose

Storing construction materials.

issues and assumptions

Data on the amounts of Class IV barrier material (barbed wire, lumber, etc.) for individual Military Units is not currently available, even though each CEGE site is to have this material available for REFORGER exercises and mobilization. Materials are stored at semi-enclosed hardstand areas to the extent of a "Division Amount." Each Military Unit then draws its individual required amount during the issue process from the bulk supply.

Class IV materials are also required for mobility tasks to insure both forward and lateral routes of movement, including river crossing operations. Counter-mobility tasks, such as obstacle construction and barriers, require similar materials.

Typical quantities of Class IV materials for a POMCUS site include:

Sand bags	1,000,000
concertina	25,000
barb wire (1,000 ft. reel)	1,000
3/4 inch wire rope (ln. ft.)	4,000
post picket, screw - 2 ft.	1,200
post picket, screw - 5 ft.	2,200
post picket, screw - 8 ft.	30,000
post, metal fence - 5 ft.	35,000
post, metal fence - 2 ft.	2,500
cement (bags)	5,000
culvert pipe (nestable)	
2 ft. dia.	3,000 ft.
4 ft. dia.	3,000 ft.
6 ft. dia.	300 ft.
mine field marking set	75
mine signs (aluminum, red)	50,000
airfield matting	(as required)

activities

1. Receive and store.
2. Inventory.
3. Issue.

personnel

No one assigned continuously.

equipment

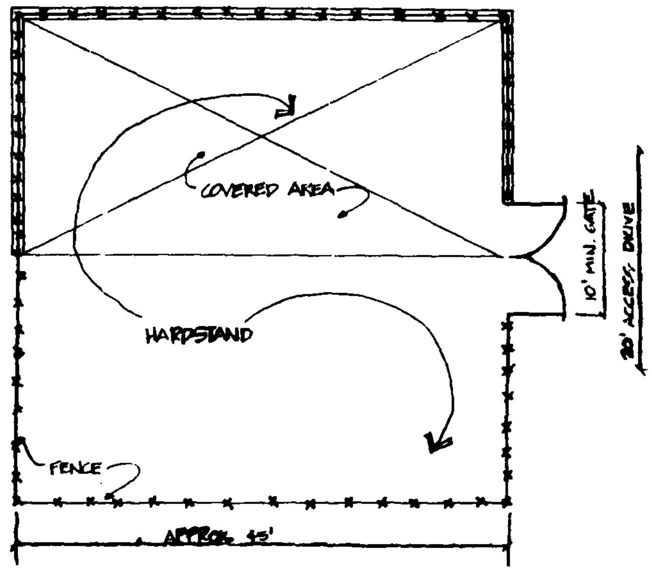
requirements

1. Adequate area.
2. Secure.
3. Hardstands.
4. Lighting.

criteria

1. 2000 sq. ft., with 1/2 covered.
2. 8 ft. chain-link fence with 3-strand barbed-wire top.
3. -
4. Exterior floodlights - 50 lux.

guidance



NOTES

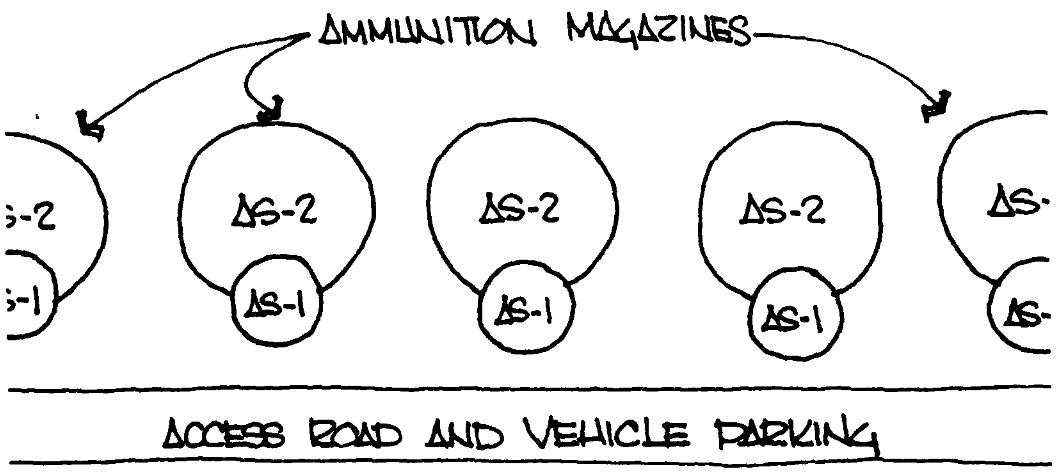
Literature Information

Class V Supplies Storage Facilities 6.2

User Information

AS-1 Receiving/Issue 6.8

AS-2 Storage/Inventory 6.10



PURPOSE

ISSUES and ASSUMPTIONS

a. 4.10.1 The number of nonpartitioned magazines and ready ammunition bunkers and their size, depending on quantity of stocks and hazard and compatibility classes, will be specifically justified in each case. (2)

b. 4.10.1 NATO safety principles, in accordance with AC/2548-0/70 for the storage of ammunition and explosives, will be observed in planning these storage facilities. However, when host nation regulations require more rigid safety measures, these deviations will be considered on a case-by-case basis. (2)

c. 4.1.1 Weapons, Vehicles, COMMO Equipment, etc. will be stored in either:

-Controlled Humidity Storage Structures
-Individual Flexible Barrier Storage (IFBS)
-Open Storage (2)

d. 5.2.4.1 Use of Storage Facilities. Only structures designed, designated or isolated for the storage of explosives, ammunition or loaded components should be used. When specially constructed magazines are not available, substitute buildings must afford suitable protection against moisture and excessive changes in temperature. Adequate ventilation is necessary. Open storage is undesirable and will be used only as an emergency expedient when authorized by appropriate command headquarters. (3)

e. 3.1 Covered space is preferred. When sufficient covered space for all items to be stored is not available, priority should be given to items which are most susceptible to deterioration from the elements. SB 38-8-1 should be used as a guide for establishing the items most susceptible to deterioration. (6)

f. 3.1 Open sites should be improved hardstands. Unimproved sites should be firm, well drained, and kept free of excessive vegetation. (6)

g. 2.5.7.2 Narrow aisle operating equipment will be used to maximum extent practicable to effect reduction in or minimizing of aisle widths. (3)

REQUIREMENTS

a. 1.4 Class V. Depending on the ammunition distribution by hazard and compatibility classes, ammunition and explosive storage buildings which meet the requirements of NATO document AC/258-D, Principles for the Storage of Ammunition and Explosives, will be PROVIDED. (2)

b. 4.10.1 An average gross interior area of 1.5 sq m per metric ton of ammunition and explosives to be stored will be PROVIDED. (2)

c. 4.10.1 An Intrusion Detection Alarm System used for Conventional Ammunition Storage, and containing magnetic contact sensors at doors and magnetic grid at the vents shall be PROVIDED. All doors will be fitted with high security hasps and padlocks. (2)

d. 4.2.1 CHS warehouses will be of semi-permanent type construction providing the controlled humidity storage requirement can be met. (2)

e. 4.2.1 An annex to each warehouse will be PROVIDED to house dehumidifying equipment. Necessary dehumidifier units will be PROVIDED. (2)

CRITERIA

GUIDANCE

a. 5.2.4.2 Types of Facilities. Types of ammunition facilities and preferred usage are defined in TM 9-1300-206. (3)

b. 5.2.4.6.1 An overall policy has been established for the control of subterranean termites in ammunition magazines. A method which isolates the structure from these termites by providing a layer of poison soil under slabs or around footings is the most effective. The Corps of Engineers advocates this type of treatment for new structures. The principle also is readily adaptable to structures already in place. (3)

REQUIREMENTS

f. 1.12 In areas of POL, bottled gas storage, or any potentially fire hazardous areas, explosion proof wiring and fixtures shall be PROVIDED, along with adequate ventilation system. (2)

g. 3.5 The lighting system shall provide minimum illumination intensities as follows:

h. 8.1 The general layout is to be adapted to the landscape. Existing vegetation is to be conserved to the maximum extent possible. Planting of earth covered Class V storage magazines with grass and/or indigenous plants will be PROVIDED. (2)

CRITERIA

g. 3.5.1 100 lux inside warehouses and storage buildings, measured at floor level. (2)

g. 3.5.3 5 lux outside of all storage and administrative buildings at midpoint of lower edge of each door only, around the perimeter of open storage areas for routine security and personnel safety purposes, at entrances through the fence, and around Class V storage. (2)

h. 8.1 All above-ground buildings will be PROVIDED a matte finish waterproof paint of colour blending with surroundings. (2)

GUIDANCE

REQUIREMENTS

i. 7.5.1 Illuminated access aprons, one per door of magazines and bunkers, (Class V utilizes interlocking concrete block), as well as illuminated concrete aprons (tracked vehicles) around the Vehicle Maintenance and Preservation Facilities, Trades Building, Wash Racks, Grease Racks, Non-Mech Maintenance Facility, and POL Storage & Pump Station shall be of sufficient size to permit turning and backing of larger vehicles. (2)

j. 5.2.4.2.1 Fusible links will be provided on magazines. (3)

CRITERIA

i. 7.5.2 All aprons will be constructed of rigid pavement except around Class V magazines and bunkers as noted above. (2)

j. 5.2.4.2.1.1 The melting point will be between 155° and 165° F. The rated breaking strength will be 20 pounds for the door ventilator link and 8 pounds for the rear-stack ventilator link. The fusible link used will be on the current approved list published by the Underwriters Laboratories, Inc., or other recognized testing laboratories. (3)

j. 5.2.4.2.1.2 Fusible links will not be painted. (3)

GUIDANCE

REQUIREMENTS

k. 2.5.7.3 As a means of contributing to storage regularity and also to provide a desirable safety factor, warehouse aisle boundaries will be clearly identified by painted stripes. (3)

l. 5.2.4.4.3 Storage of ammunition in standard above-ground magazines will provide access aisles of sufficient width to accommodate forklift trucks at doors 1, 3, and 5. (3)

CRITERIA

k. 2.5.7.3 The width of these stripes will not exceed 4 inches nor be reduced below 3 inches, and will be consistent throughout an installation's warehouses. White Gloss No. 17875, as identified in Federal Standard TT-C-595, and as required by AR 385-30 will be used for this purpose. Paint will conform to Federal Specification TT-P-115, Paint, Traffic, Highway. (3)

GUIDANCE

NOTES

DI 6

AS-1 RECEIVING/ISSUE

function/purpose

To receive and issue ammunition and other explosives for the military units.

issues and assumptions

1. Authorized quantity of ammunition storage:

   A major constraint in determining the amount of ammunition bunker capacity allowed at a proposed CEGE site is the host nation regulation "Restricted Area Agreement," that explicitly states the metric tonnage amounts of various ammunition types and other explosives.

2. Unloading and loading practices:

   Receiving and issue operations are governed by AR 55-355 and any additional host nation requirements. Optimum practices are described in TM 9-1300-206.

activities

1. Receive devices.
2. Palletizing.
3. Remove and replace shipping bands on bombs.
4. Issue devices.

personnel

Varies.

equipment

1. Forklift.
2. Dollies.

requirements

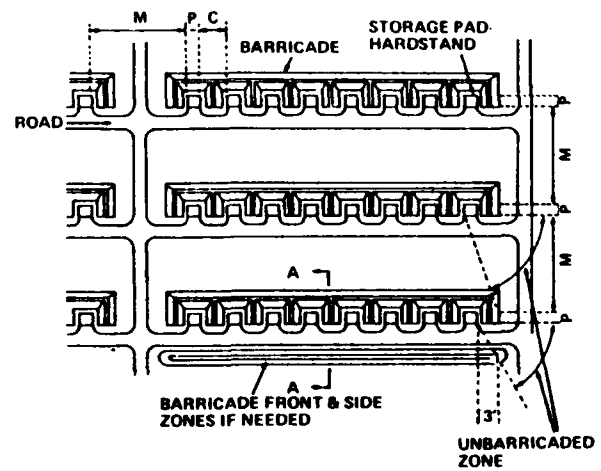
1. Hardstand road and access aprons.
2. Separation between storage modules for issue access.
3. Loading docks with levelers.
4. Illumination.

criteria

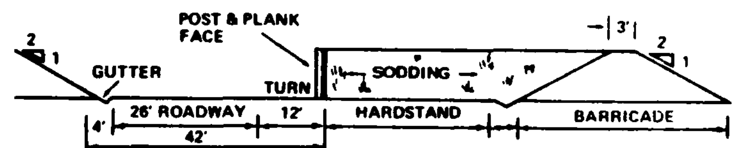
1. See "Guidance" for typical layout at a barricade-type 8-cell module.
2. Trucks must remain 25 ft. from the magazine openings while running. Loaded vehicles should not be held in open areas between magazines.
3. Docks are considered as "magazines," and thus require area and location based on "Quantity-Distance" tables.
4. 250 lux at entries, 100 lux in magazines, 50 lux at access aprons.

guidance

PAD SIZE (P), AND DISTANCES BETWEEN CELLS (C) AND MODULES (M) VARY.



TYPICAL 8 CELL MODULE



SECTION A-A

DI 6

AS-2
STORAGE/INVENTORY

function/purpose

To store and maintain inventory control of the ammunition and other explosives.

issues and assumptions

1. Explosive quantity related to storage magazine distance of separation:

The quantity of explosive material is the basis for determining protection distance separation relationships. These relationships are based on levels of risk considered acceptable for the stipulated exposures and are tabulated in "Quantity-Distance" tables in DOD 5154.45 DOD Ammunition and Explosives Safety Standards, Jan 1978 and DA TM 9-1300-206, Ammunition and Explosives Standards. These separation distances should be considered minimums, and greater distances should be used whenever practicable.

Storage Calculations:

Ammunition Storage igloos each at $90m^2$.
Space criteria = 0.96 sq. meters/short ton (STON)
STONS ammunition to be stored=4700 STONS
Space needed = (0.96 sq. m/STON) (4700 STONS) = 4500 sq. m

Space per igloo=$90m^2$/igloo
Igloos required = $\frac{4500 \text{ sq. m}}{90 \text{ m}^2/\text{igloos}}$ = 50 igloos

activities

1. Removing and replacing grommets on separate loading shell.
2. Replacing damaged or loose strapping on boxes of ammunition and explosives.
3. Air sampling toxic munitions.
4. Placing inner cover retainer springs in one-round metal containers.
5. Stenciling or re-stenciling containers.
6. Removing tail plugs for surveillance.
7. Inspecting propelling charges and bulk solid propellants.
8. Air-testing solid propellants or propelling charge containers.
9. Preservation and packaging of small arms ammunition; unpacking, linking, and repacking.
10. Operations incident to liquid-level determination by use of probe sensor, and safing procedures for mines, etc.

personnel

2 - LNs; varies.

equipment

1. Movable dollies for individual types of ammunition and explosive devices.
2. Work bench (8 ft. x 3 ft.).
3. 2 inspection tables (6 ft. x 3 ft. each).
4. Wall display panel at tables (8 ft. x 4 ft.).

requirements

1. Safe distance from other storage <u>types</u>, based on quantity.
2. Temperature control.
3. Humidity control.
4. Security.
5. Circulation.
6. Adequate storage capacity.
7. Illumination.
8. Security Fence.

criteria

1. (See DOD 5154.45 or TM 9-1300-206 for quantity-distance tables.) The maximum net weight of explosives within each magazine location is 500,000 lbs.
2. Cannot exceed 100^{0}F for more than 24 hours.
3. If heating is used to prevent condensation, materials must be 18 inches from heating element.
4. Magazines must be kept locked when unmanned.
5. Aisles shall be provided so that units in each stack may be inspected, inventoried, and removed for shipment or surveillance test.
6. Storage unit capacities should be calculated in cubic dimensions then related to weight/cubic dimension of the various ammunition and explosive devices.
7. 250 lux at work areas, 100 lux in magazines.
8. <u>FENCES FOR PHYSICAL SECURITY:</u> ISAE has received information from the USAREUR Provost Marshal office that forthcoming physical security guidance will state that ammunition and explosive storage sites will require a minimum fence height of six feet and that a topping of a single outrigger with three strands of barbed wire will be required, facing out. *If weapons and ammunition are jointly stored, as in an upload area, then a minimum fence height of six feet is required and a topping requirement of two 18-inch long outriggers, with three strands of barbed wire on the outer outrigger and a reinforcing wire on the inner outrigger, will be installed at 45 degrees to form a "Y," with a roll of 24/30 inch diameter barbed tape placed between the "Y" outriggers and barbed wire.* (AEUES-CN-M/2136-6263)

guidance

1. Army standard magazine types include:
   a. Igloo type:
      1) Reinforced concrete, arch-type, earth covered -- for *quantities up to 500,000* lbs.
      2) Special use magazines of steel construction -- for quantities up to 100,000 lbs.
   b. Navy standard arch-type:
      1) For quantities of up to either 250,000 or 500,000 lbs. depending upon construction strength.
   c. Earth covered, corrugated steel arch type.
   d. Above ground, "barricaded" cell modules (usually earth berms as the barricade).

NOTES

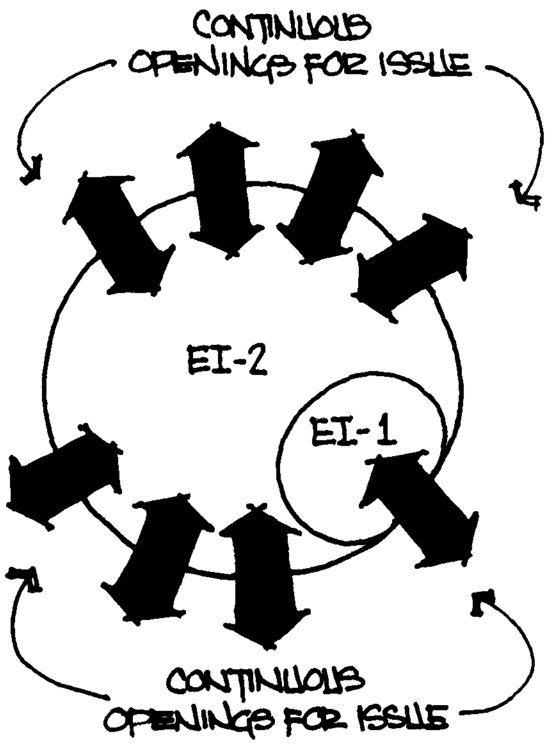
Vehicle & Equipment Storage (Class VII)

Literature Information

Controlled Humidity Warehouses (CHW) 7.2
Stress Tension Structures (STS) 7.6
Individual Flexible Barrier Storage (IFBS) 7.8

User Information

EI-1 End-Item Receiving 7.12
EI-2 End-Item Storage 7.14



PURPOSE

4.11.1 All major end items shall be in controlled humidity storage, with the exception of non-powered equipment such as trailers, which can be in open storage. Controlled humidity storage structures for this purpose shall be PROVIDED. (2)

ISSUES and ASSUMPTIONS

1.2 For those materials and supplies which may deteriorate or be damaged if stocked in the open, roofed open storage or controlled humidity storage will be PROVIDED. (2)

3.10.2.1 In high humidity environment, conventional storage facilities do not afford adequate protection to certain types of supplies preserved Level C against damage and deterioration that can result from excessive humidity. This is particularly applicable where supplies are to remain in storage for extended periods. To insure that the capability of material to perform its intended function will not be impaired or that supplies will not become unfit for consumption as a result of exposure to excessive humidity, methods have been developed to provide control of humidity within storage warehouses. (7)

3.10.7.10.2 Where battery-powered equipment cannot be or is impracticable to obtain or use in controlled humidity storage, gasoline-engine-powered equipment can be used with certain precautions. In use of such equipment, certain factors must be considered. (7)

3.10.7.10.2.2 When utilizing engine-driven materials-handling equipment in controlled humidity warehouses, any concentration of carbon monoxide gas which exceeds 100 parts of carbon monoxide per 1,000,000 parts of air must be prevented. (7)

3.10.3.3 The modern, permanent warehouses (WW II and later) are preferred for the storage of current distribution stocks. These warehouses will be converted to controlled humidity space (by section or complete warehouse) as required and permitted by available funds. (7)

3.10.3.5 Sections of warehouses used exclusively for shipping, receiving, and box shop operations normally will not be converted to controlled humidity space. (7)

3.10.3.6 Considering cost of installation and continuing cost of operation, controlled humidity space can be installed most economically in permanent and standard portable frame warehouses, such as: (7)

3.10.3.6.1 Permanent-type standard warehouses constructed since 1950, 200'X 1000', built-up roof, concrete roof decking with steel framing or laminated wood roof framing, block or brick side walls and dock level floors. (7)

3.10.3.6.2 Permanent-type warehouses, gabled roof with steel framing; block or tile walls, windows, and louvers. (7)

3.10.3.6.3 Permanent-type warehouses constructed between 1940 and 1950, 180'x1440' (or multiples of 240' sections), with monitor in center third of roof, block or brick side walls, and dock level floor. (7)

ISSUES and ASSUMPTIONS

1. Examination and evaluation of existing structures (11):

If existing buildings are being considered for reuse as POMCUS facilities, it is necessary to analyze the renovation costs against "new construction" costs. Major costs have been required to make existing buildings responsive to POMCUS activities; especially,

1) control of humid air infiltration into CHW at existing openings.

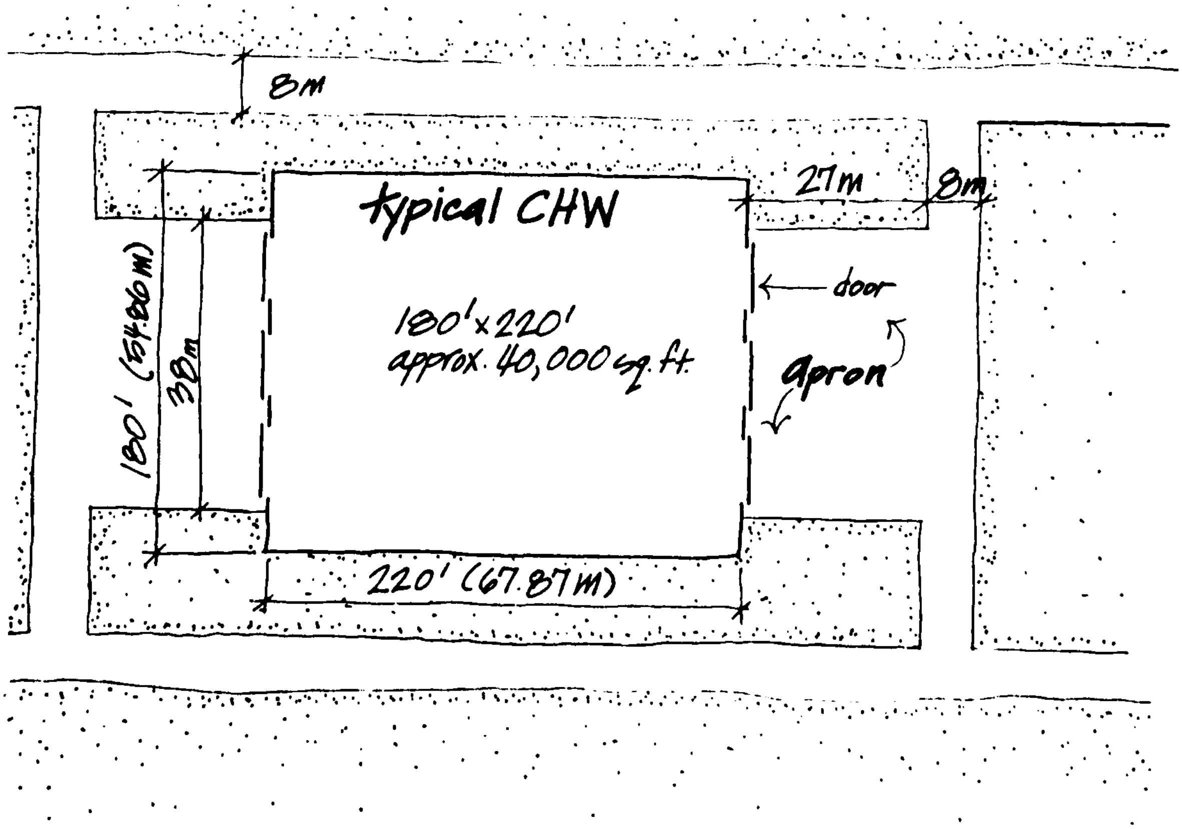
2) adequate insulation for temperature controlled buildings,

Roads per CHW: 500m x 8m = 4000m^2

Turnpads per CHW: 1@ 10m x 20m = 200m^2

Aprons (2 per CHW): 1=38m x 27m = 1026m^2 each or 2052m^2 per CHW

Total per CHW = 6252 m^2



REQUIREMENTS

a. 4.2.1 CHS warehouses will be of semi-trailer type construction providing the controlled humidity storage requirement can be met. (2)

b. 4.2.1 An annex to each warehouse will be PROVIDED to house dehumidifying equipment. Necessary dehumidifier units shall be PROVIDED. (2)

c. 3.10.3.1 Controlled humidity storage space should be provided for areas where the outdoor relative humidity is 40 percent or above for more than 50 percent of the total time. (7)

d. 3.10.7.1 Controlled humidity equipment should be located within the warehouse so as not to obstruct traffic aisles. (7)

e. 3.10.7.2 It is essential that the entrance of humid air into controlled humidity warehouses be kept to the minimum in order to maintain the relative humidity at desired level. Door control is of paramount importance, since the greatest source of moisture penetration is through open doors. An alarm system may be provided to signal open doors. (7)

CRITERIA

a. 3.10.3.2 Equipment for the control of humidity in storage space will be operated so as to maintain 40 percent relative humidity (RH). (3)

GUIDANCE

1.2

For all CHS warehouses and other buildings, austere construction will be employed as far as possible. Austere construction means light prefabricated metal, cement, or cinder block or other low cost nonflammable construction, which will insure sufficient protection against climatic conditions of the site. (2)

NOTES

PURPOSE

4.2.2 Stress Tension Structures (STS) may be used as warehouses for controlled or uncontrolled humidity storage. They can provide economical storage space for a wide variety of items. (2)

ISSUES and ASSUMPTIONS

4.2.2.1 When STS are used for storage in Type II Forward Storage Sites (FSTS), they shall have a 10 to 12-year life expectancy and will be replaced upon termination of structure life. (2)

When STS facilities are considered to be Real Property (rather than as "relocatable structures"), OM&A funding for continuing maintenance should be considered.

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TYPE II FORWARD STORAGE SITE FACILITIES: POMCUS SYSTEM. VOLUME --ETC(U)
SEP 80 R L PORTER
UNCLASSIFIED CERL-TR-P-112-VOL-2 NL

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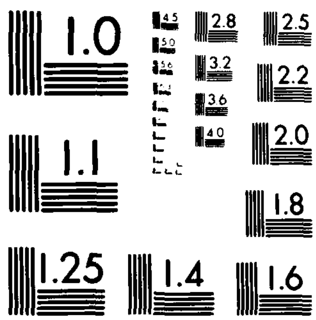


MICROCOPY RESOLUTION TEST CHART

REQUIREMENTS

a. 4.2.2.1 When STS are used for storage in Type II Forward Storage Sites (FSTS), the structures themselves and all lighting, heating, and humidity control equipment shall be PROVIDED. (2)

b. 4.2.2.1 Concrete floor slab, foundation, and all utilities connections shall be PROVIDED. (2)

c. 4.2.2.2 Each STS shall be PROVIDED with two personnel doors. (2)

d. 4.2.2.2 Each STS shall be PROVIDED with two vehicle access doors. (2)

e. 4.2.2.2 Each STS shall be PROVIDED with a flexible pavement access apron. (2)

CRITERIA

GUIDANCE

PURPOSE

4.3.1 Individual Flexible Barrier Storage (IFBS) is used for storage of vehicles in an individual controlled humidity environment. The covering is flexible and removable from the vehicle. (2)

ISSUES and ASSUMPTIONS

a. 4.3.2 IFBS containers and dehumidifying equipment are PROVIDED with a 6- to 8-year life expectancy, and will be replaced upon termination of structure life. (2)

b. 4.3.5 Size of the storage and repair areas will depend on the number of flexible barrier packages and shall be justified on a case-by-case basis. (2)

c. 4.3.1 If the flexible barrier is supported by ridge poles, a flexible door shall be provided. (2)

d. If IFBS is used, the following problems have been found relevant (11):

1) Labor intensiveness
2) High electrical energy requirement
3) Enclosure materials vulnerable to cracking in cold weather.

REQUIREMENTS

a. 4.4 Concrete hardstands for open storage will be PROVIDED. (2)

b. 4.3.2 All utilities connections and hardstands for parking of IFBS vehicles or equipment shall be PROVIDED. (2)

c. 4.3.3 Electrical power connection shall be PROVIDED to each parking pad for operation of electrical dehumidification equipment within each IFBS container. (2)

d. 3.5.5 Area lighting will be provided on all buildings, loading ramps, washracks, grease racks, IFBS areas, exterior storage and work areas, security facilities, and along fences for night operations. (2)

CRITERIA

a. 4.3.3 Hardstand for parking IFBS vehicles and equipment shall be of rigid pavement construction, 7m x 15m for each individual pad or mass hardstands to provide 105 sm parking area per vehicle. (2)

a. 4.3.3 Pads shall not be spaced closer than 20 meters on center. (2)

GUIDANCE

7.2.2 Roads within hardstand areas used for IFBS storage shall be of sufficient width to accommodate maneuverability of the largest vehicle to be stored when in a dead (inactive) state and being towed by an appropriate recovery vehicle. This requires that consideration be given to the length of both vehicles plus a towbar with allowance for turning radius to assure a straight-in approach. The IFBS shall be angled to provide maximum utilization of the approachway and to reduce the width to the minimal operational requirement. (2)

REQUIREMENTS

e. 4.3.4 Facilities for the maintenance, repair, and storage of the flexible barriers and other materials used with the IFBS system shall be PROVIDED. Storage areas shall be covered and unheated. (2)

f. 4.3.4 All equipment used for maintenance or repair of the flexible barriers shall be PROVIDED. (2)

g. 4.3.2 The roads necessary to reach the individual parking pads shall be PROVIDED. (2)

CRITERIA

g. 7.2.2. All two way roads will be 8.5 meters wide. All one way roads will be 4.0 meters wide. A stabilized shoulder will be provided for each road .5 meters wide on each side. (2)

GUIDANCE

NOTES

DI 7

EI-1

END-ITEM RECEIVING

function/purpose

To receive, inventory, and provide "in-place" minor upkeep activities.

issues and assumptions

Basic Issue Items (Including some non-sensitive components of end items and items troop installed or attached).

These items consist mostly of hand tools, spare tires, compressed gases, and canvas and bows. Most BII is relatively inexpensive, expendable, and requires almost no maintenance while in storage. When received, BII is in depot level A pack, which is designated to withstand the rigors of outside storage, overseas shipment, and relatively rough handling for an extended period of time. At current POMCUS sites, it is sometimes stored in the same warehouse as the vehicles upon which it is used, but normally in a separate non CH warehouse.

activities	personnel	equipment
1. Uncrate and inventory.	(1) Hand Receipt Officer. (1) Clerk.	1. Desk (30 in. x 60 in.) with chair. 2. Table (84 in. x 30 in.) with two chairs. 3. Display board (84 in. x 48 in.) with table and desk.
2. Location verification.	(1) Clerk.	4. Planograph.
3. "Dry parts" installation.	Various maintenance personnel or QC personnel.	
4. Inspections: periodic exercises, i.e., gun tube movement.	Various maintenance personnel and QC personnel.	

requirements	criteria
1. Loading dock (exterior covered area).	1. 300 sq. ft.; 3 ft., 10 in. high (or adjustable height).
2. Interior open area, adjacent to table and desk.	2. Approximately 400 sq. ft.
3. Illumination.	3. 300 lux flourescent fixtures at receiving area and 150 lux at exterior dock area.
4. Heat.	4. 20°C during winter.
5. Power.	5. 110V - 4 duplex outlets at table area.

guidance

1. Facility areas for "End-Item" receiving function (EI-1) and storage function (EI-2) are to be located in a series of separate controlled humidity warehouses (CHW) of between 20,000 to 40,000 sq. ft. each. Both functions are repeated in each warehouse for the particular military unit(s) end-items stored.

DI 7

EI-2

END-ITEM STORAGE

function/purpose

To store Class VII end items (vehicles and other equipment).

issues and assumptions

1. Battery storage location:

   Current practice is to store batteries in the various warehouses with their vehicles. (See Battery Activation Facility).

Electrolyte is stored outside in CONEX containers adapted for that purpose. The most recent guidance on activating batteries for REFORGER calls for CEC personnel to activate enough batteries for the first unit to arrive, for that unit to activate batteries for the following unit, and so on.

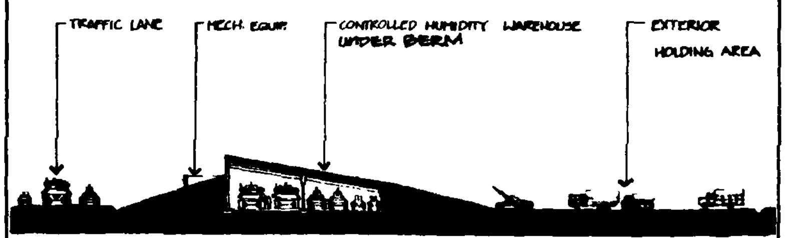
activities	personnel	equipment
1. Initial location.	1 - Storage Officer. 1 - NCOIC. 1 - LN.	1. 1 - Planograph.
2. Move-in to storage location.	Drivers as required. 1 - LN.	2. 1 - M578. 1 - M88. 2 - M113. 2 - Rough terrain forklifts. 2 - M880. 1 - 5-ton tractor. 2 - Warehouse tractors.
3. Monitor humidity, etc.		3. Humidity reading charts.

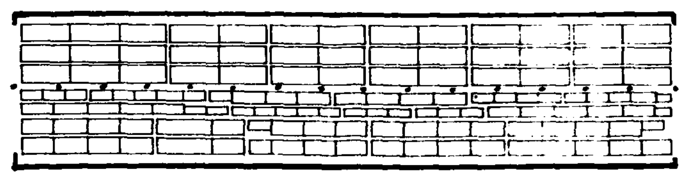
requirements	criteria
Exterior Storage	
1. Hardstand entrance (35-ft. turning radius) aprons.	1. Concrete areas adequate for 35-ft. turning radius.
2. Adequate space for: a. Trailers. b. MABS. c. Overflow from warehouses.	2. Determine sq. ft. required from TAADS data.
3. Security fence.	3. 8-ft.-high, chain-link with three strands of barbed wire.
4. Drainage ditches.	4. Cross-overs for drainage ditches so that all areas are readily accessible.
5. Cages for oxygen and acetylene.	5. See "Compressed Gas Facility."
6. Shed for electrolyte.	6. See "Battery Activation Facility."
Interior (CH) Storage	
1. Flexible open storage space.	1. No interior columns. Warehouses should be built with the equipment each will house considered.
2. Airplane hangar-type doors.	2. Configured so that 2 complete opposite sides of the warehouse will open up.
3. Floor.	3. Concrete with grid markings.
4. Ventilation system.	4. Filter to remove all dust from the air in the warehouse. Control to 50 percent relative humidity.
5. Heat.	5. Capability to 10°C.
6. Fueling system.	6. Exterior connection for 5000-gal. tanker.
7. Battery conveyor system.	7. Adjustable both ways overhead of vehicles.
8. Illumination.	8. 50-lux general light level with 110V outlets for adjustable lights (for parts installation and/or inventory).
9. Power.	9. 110V for maintenance tools throughout storage area.

guidance

1. For REFORGER exercises (and mobilization), there should be hardstands for vehicles to assemble between the CHW of the vehicles and the nonmechanical equipment storage buildings, if such equipment is "down-loaded."

2. Warehouses and site layout must be constructed so that there is more than enough turning radius (35 ft.) for any vehicle being pulled.





TYPICAL STORAGE FACILITY PLAN

NOTES

DI 8

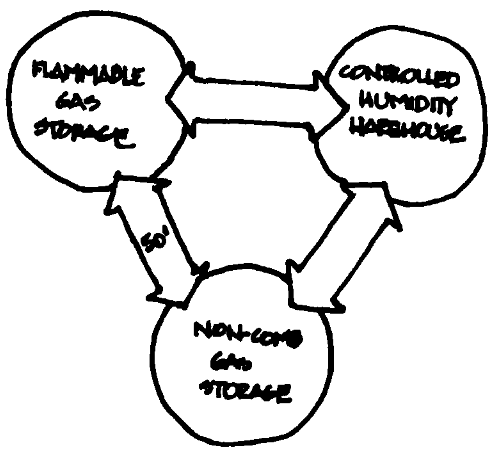
Compressed Gas Storage [Class VII]

<u>Literature Information</u>

Compressed Gas Storage 8.2

<u>User Information</u>

CG-1 Issue/Inspection/Storage 8.6



PURPOSE

4.14.1 Non-combustible or fire resistant building detached from other buildings is essential to the safe, controlled storage and dispensing of these gases for use by the facility personnel during all welding, brazing, and torch fabrication procedures. (2)

ISSUES and ASSUMPTIONS

4.14.1 The size of this building will be determined by quantity of material used at any one site, and can be increased above 80 cubic meters if sprinkler system is provided. (2)

REQUIREMENTS

a. 4.14.1 Compressed Gas Storage. A compressed gas storage building shall be PROVIDED for storage of argon, acetylene, and oxygen gas bottles. (2)

b. 4.14.2 Gas-tight,solid, non-combustible partitions will be used to separate oxygen and other combustion supporting gases from flammable gases. (2)

c. 4.14.2 Space will be designed for storage of empty cylinders separated from full cylinders. (2)

d. 4.14.6 Anti-intrusion security alarm system shall be PROVIDED. (2)

e. 4.14.7 This building should be sited with consideration for prevailing winds and readily accessible from all sides to fire fighting equipment and isolated from all other buildings and stored material as much as possible. (2)

CRITERIA

a. 4.14.3 Floor shall be designed to support a load of 1,500 kg/ square meter and shall have a slip-resistant, spark-proof covering.(2)

a. 4.14.2 Bottle-retaining racks for safe, secure storage shall be PROVIDED. (2)

e. 4.14.2 Individual sheds will be separated from each other by at least 8 meters. (2)

e. 4.14.1 Compressed gas storage building will be separated by at least 15 meters from other facility buildings. (2)

e. 4.14.7 This building shall be sited a minimum of 8 m from the nearest occupied building and 33 m from other gas storage buildings. (2)

GUIDANCE

4.14.2 Acetylene cylinders shall be stored upright and all other cylinders may be stored in an upright or horizontal position. (2)

REQUIREMENTS

f. 4.14.4 The building will be provided with adequate ventilation. (2)

CRITERIA

f. 4.14.4 The building will be ventilated by means of permanent louvered openings at floor and ceiling levels, as well as having 6" diameter vents from floor to roof. (2)

g. 4.14.5 As a minimum, one door capable of allowing fork lift entrance and a minimum of two separate personnel doors located at opposite extremities of the building with panic hardware to instantly defeat the door lock system shall be PROVIDED. (2)

GUIDANCE

NOTES

DI 8

CG-1

ISSUE/INSPECTION/STORAGE

function/purpose

Providing safe, controlled storage, inspection, and issue of compressed gases.

issues and assumptions

activities	personnel	equipment
1. Receiving of gas. 2. Inspecting gas content. 3. Storage of gases. 4. Periodic inventory of gases. 5. Removal of cylinders from storage. 6. Issue to users.	2 - local nationals.	1. Forklift. 2. Dolly.

requirements

1. Adequate area.
2. Power.
3. Lighting.
4. Secure enclosure.
5. Ramp for loading and unloading from truck bed.

criteria

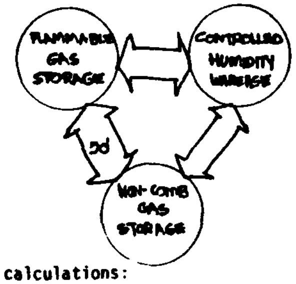
1. Area for up to 120 bottles:

   a. Secure area for 60 oxygen cylinders.

   b. Secure area for 60 nitrogen cylinders.
2. 110 V.
3. 150 lux at circulation aisles.
4. Structure with roof and flooring - lockable door and gate.
   *Enclosure could be either fenced or solid walls.
5. 3 ft., 10 in. high.

guidance

The storage of flammable and non-combustible gases must be separated by at least 50 ft. and should not be near the controlled humidity warehouse storage areas also.



Example storage calculations:

(1) Typical quantities

Acetylene	Oxygen	Argon	Nitrogen		Total
380	290	6	14	=	690

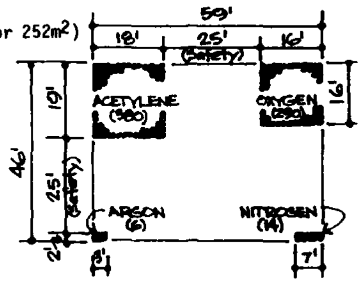
(2) Cylinder dimensions

Acetylene - 44 in. high, 12 in. diameter
Oxygen, Argon, Nitrogen - 57 in. high, 9.5 in. diameter

(3) 8 meter (25 ft.) safety separation between gases.

(4) Layout for smallest total area:

59 ft. x 46 ft. = 2714 sq. ft. (or 252m^2)



(5) Net area of cylinders:
(18X19)+(16X16)+(2X3)+(2X7) = 618 sq.ft. (or 57.4m^2)

(6) therefore, planning factor of gross area to net area = 4.4

NOTES

Medical Supply Storage (Class VIII)

Literature Information

Class VIII Medical Supplies Storage Facilities 9.2
Controlled Humidity Warehouses 9.6
Stress Tension Structures 9.10

User Information

(All non-shelf life medical items are being up-loaded on the vehicles in CHWs)

PURPOSE

4.12.1 A Medical Storage Facility is necessary as this equipment is an essential part of the basic load of combat supplies to be stored at POMCUS sites. (2)

ISSUES and ASSUMPTIONS

a) 4.1.1 Weapons, Vehicles, COMMO Equipment, etc. will be stored in either:

-Controlled Humidity Storage Structures
-Individual Flexible Barrier Storage (IFBS)
-Open Storage (2)

b) 4.12.1 The size of this facility will vary depending on the number of medical UIC's assigned at any POMCUS site. (2)

c) 4.12.1 Required floor space will be specifically justified in each case. (2)

d) 3.1 Covered space is preferred. When sufficient covered space for all items to be stored is not available, priority should be given to items which are most susceptible to deterioration from the elements. SB 38-8-1 should be used as a guide for establishing the items most susceptible to deterioration. (6)

e) 3.1 Open sites should be improved hardstand, if available. Unimproved sites should be firm, well drained, and kept free of excessive vegetation. (6)

f) 2.5.7.2 Narrow aisle operating equipment will be used to maximum extent practicable to effect reduction in or minimizing of aisle widths. (3)

REQUIREMENTS

a. 4.12.1 Medical storage facilities shall be PROVIDED at Type II Forward Storage Site (FSTS) for storage of medical supplies and equipment. (2)

b. 4.12.2 Building shall contain a controlled-temperature (S=5-30°C) storage area and a small storage workship area to accommodate testing and servicing of stored medical equipment. (2)

c. 4.2.1 CHS warehouses will be of semi-permanent type construction providing the controlled humidity storage requirement can be met. (2)

d. 4.2.1 An annex to each warehouse will be PROVIDED to house dehumidifying equipment. Necessary dehumidifier units will be PROVIDED. (2)

CRITERIA

a. 4.12.4 Floor shall be concrete with drain(s) to allow periodic washing down. (2)

a. 4.12.5 Access shall be by means of hinged, double doors sized to accommodate pallet-loader, and by means of one personnel door. All exterior doors not barred from the inside shall have high security hasps and padlocks. (2)

a. 4.12.6 Latrines and a minimum of two cold water hose bibbs in the storage area shall be PROVIDED. (2)

b. 4.12.2 Storage area shall contain palletized storage racks for organized storage and retrieval. (2)

b. 4.12.2 Workshop area shall be approximately 20 square meters. (2)

b. 4.12.2 Temperature shall be maintained within 4°C-30°C. (2)

GUIDANCE

a. 1.2 For all CHS warehouses and other buildings, austere construction will be employed as far as possible. Austere construction means light prefabricated metal, cement, or cinder block or other low cost nonflammable construction, which will insure sufficient protection against climatic conditions of the site. (2)

b. 1.2 For those materials and supplies which may deteriorate or be damaged if stocked in the open, roofed open storage or controlled humidity storage will be PROVIDED. (2)

REQUIREMENTS

e. 3.5 The lighting system shall provide minimum illumination intensities as follows: (2)

f. 2.5.7.3 As a means of contributing to storage regularity and also to provide a desirable safety factor, warehouse aisle boundaries will be clearly identified by painted stripes.(3)

CRITERIA

e. 3.5.1 100 lux inside warehouses and storage buildings, measured at floor level. (2)

e. 3.5.3 5 lux outside of all storage and administrative buildings at midpoint of lower edge of each door only. (2)

f. 2.5.7.3 The width of these stripes will not exceed 4 inches nor be reduced below 3 inches, and will be consistent throughout an installation's warehouses. White Gloss No. 17875, as identified in Federal Standard TT-C-595, and as required by AR 385-30 will be used for this purpose. Paint will conform to Federal Specification TT-P-115, Paint, Traffic, Highway. (3)

GUIDANCE

NOTES

PURPOSE

ISSUES and ASSUMPTIONS

For those materials and supplies which may deteriorate or be damaged if stocked in the open, roofed open storage or controlled humidity storage will be PROVIDED. (2)

3.10.2.1 In high humidity environment, conventional storage facilities do not afford adequate protection to certain types of supplies preserved Level C against damage and deterioration that can result from excessive humidity. This is particularly applicable where supplies are to remain in storage for extended periods. To insure that the capability of material to perform its intended function will not be impaired or that supplies will not become unfit for consumption as a result of exposure to excessive humidity, methods have been developed to provide control of humidity within storage warehouses. (7)

3.10.7.10.2 Where battery-powered equipment cannot be or is impracticable to obtain or use in controlled humidity storage, gasoline-engine-powered equipment can be used with certain precautions. In use of such equipment, certain factors must be considered. (7)

3.10.7.10.2.2 When utilizing engine-driven materials handling equipment in controlled humidity warehouses, any concentration of carbon monoxide gas which exceeds 100 parts of carbon monoxide per 1,000,000 parts of air must be prevented. (7)

3.10.3.3 The modern, permanent warehouses (WW II and later) are preferred for the storage of current distribution stocks. These warehouses will be converted to controlled humidity space (by section or complete warehouse) as required and permitted by available funds. (7)

3.10.3.5 Sections of warehouses used exclusively for shipping, receiving, and box shop operations normally will not be converted to controlled humidity space. (7)

3.10.3.6 Considering cost of installation and continuing cost of operation, controlled humidity space can be installed most economically in permanent and standard portable frame warehouses, such as: (7)

3.10.3.6.1 Permanent-type standard warehouses constructed since 1950, 200'X 1000', built-up roof, concrete roof decking with steel framing or laminated wood roof framing, block or brick side walls and dock level floors. (7)

3.10.3.6.2 Permanent-type warehouses, gabled roof with steel framing; block or tile walls, windows, and louvers. (7)

3.10.3.6.3 Permanent type warehouses constructed between 1940 and 1950, 180'x1440' (or multiples of 240' sections), with monitor in center third of roof, block or brick side walls, and dock level floor. (7)

ISSUES and ASSUMPTIONS

1. Examination and evaluation of existing structures (11):

If existing buildings are being considered for reuse as POMCUS facilities, it is necessary to analyze the renovation costs against "new construction" costs. Major costs have been required to make existing buildings responsive to POMCUS activities; especially,

1) control of humid air infiltration into CHW at existing openings,

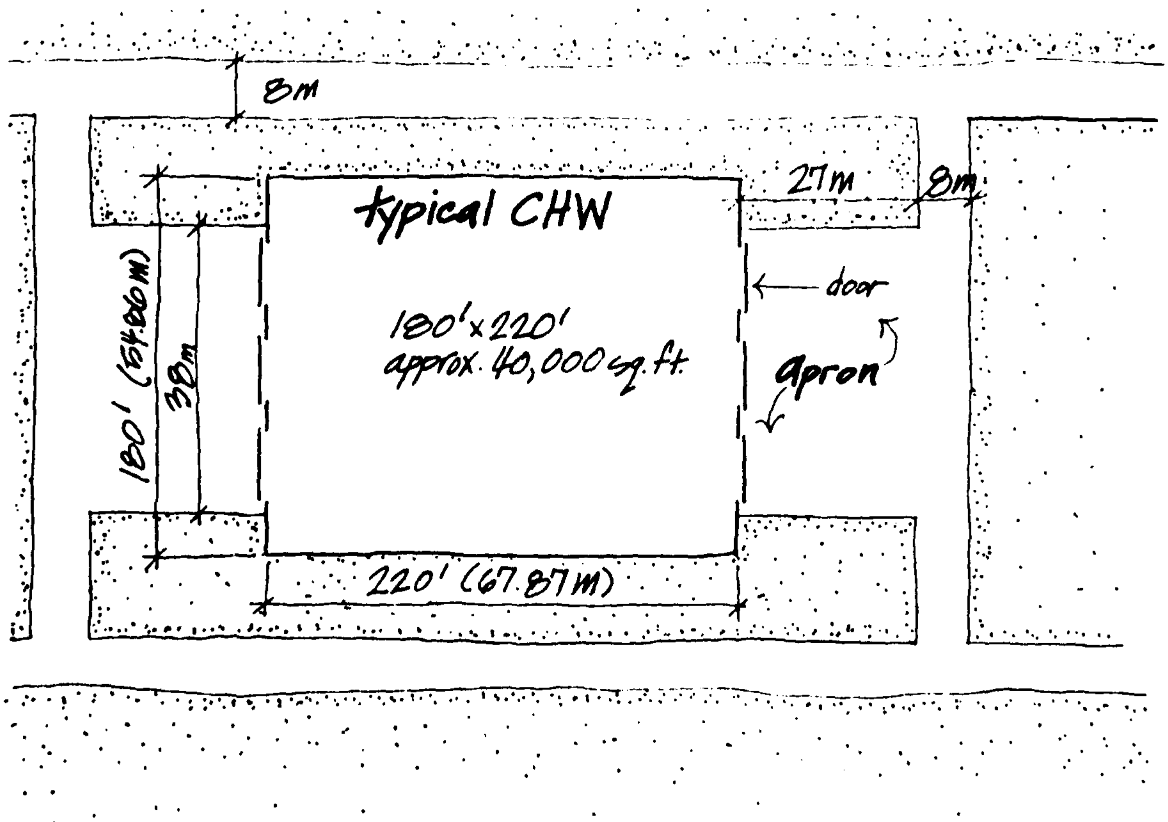
2) adequate insulation for temperature controlled buildings,

Roads per CHW: 500m x 8m = $4000m^2$

Turnpads per CHW: 1@ 10m x 20m = $200m^2$

Aprons (2 per CHW): 1=38m x 27m = $1026m^2$ each
or $2052m^2$ per CHW

Total per CHW = 6252 m^2



REQUIREMENTS

a. 4.2.1 CHS warehouses will be of semi-permanent type construction providing the controlled humidity storage requirement can be met. (2)

b. 4.2.1 An annex to each warehouse will be PROVIDED to house dehumidifying equipment. Necessary dehumidifier units will be PROVIDED. (2)

c. 3.10.3.1 Controlled humidity storage space should be provided for areas where the outdoor relative humidity is 40 percent or above for more than 50 percent of the total time. (7)

d. 3.10.7.1 Controlled humidity equipment should be located within the warehouse so as not to obstruct traffic aisles. (7)

e. 3.10.7.2 It is essential that the entrance of humid air into controlled humidity warehouses be kept to the minimum in order to maintain the relative humidity at desired level. Door control is of paramount importance, since the greatest source of moisture penetration is through open doors. An alarm system may be provided to signal open doors. (7)

CRITERIA

a. 3.10.3.2 Equipment for the control of humidity in storage space will be operated so as to maintain 40 percent relative humidity (RH). (3)

GUIDANCE

1.2 For all CHS warehouses and other buildings, austere construction will be employed as far as possible. Austere construction means light prefabricated metal, cement, or cinder block or other low cost nonflammable construction, which will insure sufficient protection against climatic conditions of the site. (2)

NOTES

PURPOSE

4.2.2 Stress Tension Structures (STS) may be used as warehouses for controlled or uncontrolled humidity storage. They can provide economical storage space for a wide variety of items. (2)

ISSUES and ASSUMPTIONS

4.2.2.1 When STS are used for storage in Type II Forward Storage Sites (FSTS), they shall have a 10 to 12-year life expectancy and will be replaced upon termination of structure life. (2)

When STS facilities are considered to be Real Property (rather than as "relocatable structures"), OM&A funding for continuing maintenance should be considered.

REQUIREMENTS

a. 4.2.2.1 When STS are used for storage in Type II Forward Storage Sites (FSTS), the structures themselves and all lighting, heating, & humidity control equipment shall be PROVIDED. (2)

b. 4.2.2.1 Concrete floor slab, foundation, and all utilities connections shall be PROVIDED. (2)

c. 4.2.2.2 Each STS shall be PROVIDED with two personnel doors. (2)

d. 4.2.2.2 Each STS shall be PROVIDED with two vehicle access doors. (2)

e. 4.2.2.2 Each STS shall be PROVIDED with a flexible pavement access apron. (2)

CRITERIA

GUIDANCE

NOTES

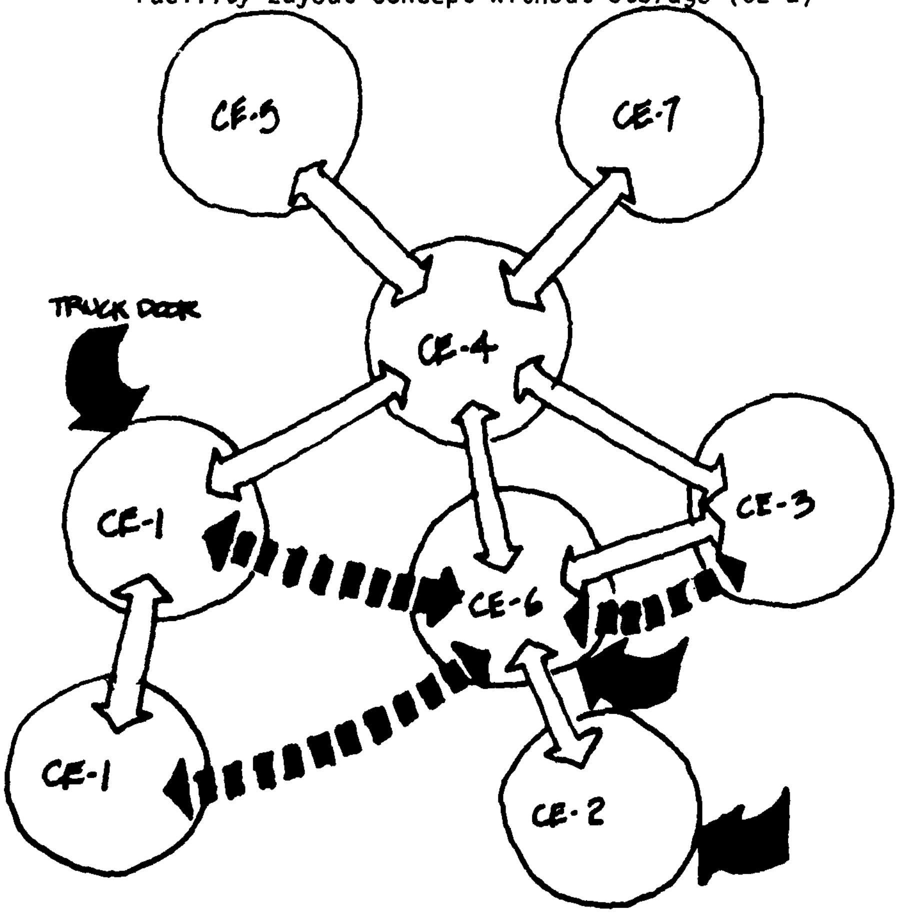
COMMEL Maintenance and Storage

Literature Information

Non-Mechanical/COMMEL/Engineering Maintenance/
Preservation Building 14.2
Class II Supplies Storage Facilities:
Dry Cell Battery Storage 14.6

User Information

CE-1 Receive/Turn-in and Issue COMMEL/
Holding Areas (Interior and Exterior) 14.10
CE-2 COMMEL Equipment and Dry Cell Battery Storage 14.12
CE-3 COMMEL Testing Room 14.14
CE-4 Preservation Workshop 14.16
CE-5 Tool and Parts Storage 14.18
CE-6 Office/Inventory Control 14.20
CE-7 Personnel Locker/Break Area/Latrines 14.22
Facility Layout Concept
Facility Layout Concept Without Storage (CE-2)



PURPOSE

9.1 This building shall be PROVIDED for the receiving, holding, testing, maintaining, and preservation of non-mechanical engineer and COMMEL equipment. (2)

ISSUES and ASSUMPTIONS

5.2 If the primary water supply required to satisfy the above demand is inadequate, or is not available, ground level storage points or open tanks will be PROVIDED. (2)

9.2 Additional requirements for special equipment as well as the number and sizes of buildings provided at each site will depend on units served and will be specifically justified in each case. (2)

1. Examination and evaluation of existing structures (11):

If existing buildings are being considered for reuse as POMCUS facilities it is necessary to analyze the renovation costs against "new construction" costs. Major costs have been required to make existing buildings responsive to POMCUS activities; especially,

1) adequate insulation for temperature controlled buildings,

2) structural adequacy for lift capacities in maintenance facilities.

REQUIREMENTS

a) 9.1 A Non-Mechanical/Commel/Engineering Maint./Preservation Building will be PROVIDED and will contain a parts and tool storage room, small parts care and preservation room, and a spray painting booth. (2)

b) 9.3 A testing room for COMMEL equipment will be PROVIDED and contain shielding from radio frequency of low output. This is to allow proper adjustment of equipment without exterior interference. (2)

c) 9.6 A derust dip tank, sand blasting area, lubrication dip tank, marine equipment testing tank, and a monorail conveyor to transport small parts through the various testing and preservation facilities shall be PROVIDED. (2)

d) 9.7 A loading dock and shelving in the parts and tool storage rooms and small parts care and preservation rooms shall all be PROVIDED. (2)

e) 9.8 Centralized compressed air system shall be PROVIDED to run the paint sprayers, perform cleaning functions, and for pneumatic tool operations. (2)

CRITERIA

d) 9.7 Loading dock shall be 13.7m X 3.0m with levelers. (2)

GUIDANCE

REQUIREMENTS

f) 9.10 Appropriately designed acoustical shielding shall be installed. (2)

g) 9.9 Wet pipe sprinkler system shall be PROVIDED for fire protection due to the use of paints, cleaning fluids, and other volatile liquids. (2)

h) 9.10 The engineering maintenance area shall be PROVIDED with an engine exhaust system to allow test running of generators and the like, within the building. (2)

i) 9.11 Ventilation system shall be capable of preventing the buildup of noxious fumes within the shop areas to reduce threat of explosion or poisoning. (2)

j) 9.12 Locker rooms containing toilets and showers for personnel shall be PROVIDED. (2)

k) 1.4 Offices and shops not having natural ventilation will have mechanical ventilation. (2)

l) 5.1.2 A water distribution system for domestic and industrial usage will be PROVIDED ensuring an adequate rate of flow to all maintenance facilities. (2)

CRITERIA

f) 9.5 Walls and ceilings of each test room will be acoustically treated to depress engine noise levels to 85 dB. (2)

i) 9.11 System shall provide 20 air changes per hour within these areas assuming an artificial ceiling height of 3 meters. (2)

k) 1.4 System shall provide ten air changes per hour, unless otherwise noted. (2)

GUIDANCE

REQUIREMENTS

m) 3.5 The lighting system shall provide minimum illumination intensities as follows: (2)

n) 9.4 The facility will be PROVIDED with a secured, paved, exterior holding area. (2)

CRITERIA

m) 3.5.2 250 lux inside of all maintenance, guard and administration facilities. (2)

n) 9.4 Area shall be 250 sq meters for engineer equipment awaiting service. (2)

GUIDANCE

PURPOSE

4.7.1.1 The facility is necessary in order to keep batteries in operating condition and maintain the communications readiness of the facility. Batteries will deteriorate with time if a proper storage facility is not provided.

ISSUES and ASSUMPTIONS

a) 4.7.1.1 Either a commercially available freezer unit or a building with cooling unit will be provided. Size of the facility will depend on the number of batteries to be stored and shall be specifically justified in each case. (2)

b) 4.1.1 Weapons, Vehicles, COMMO Equipment, etc. will be stored in either:

- -Controlled Humidity Storage Structures
- -Individual Flexible Barrier Storage (IFBS)
- -Open Storage (2)

c) 4.2.1 CHS warehouses will be of semi-permanent type construction providing the controlled humidity storage requirement can be met. (2)

d) 3.1 Covered space is preferred. When sufficient covered space for all items to be stored is not available, priority should be given to items which are most susceptible to deterioration from the elements. SB 38-8-1 should be used as a guide for establishing the items most susceptible to deterioration. (6)

e) Open sites should be improved hardstand, if available. Unimproved sites should be firm, well-drained, and kept free of excessive vegetation. (6)

f) Narrow aisle operating equipment will be used to maximum extent practicable to effect reduction in or minimizing of aisle widths. (3)

1. Examination and evaluation of existing structures (11):

   If existing buildings are being considered for reuse as POMCUS facilities it is necessary to analyze the renovation costs against "new construction" costs. Major costs have been required to make existing buildings responsive to POMCUS activities; expecially,

   1) adequate insulation for temperature controlled buildings,

   2) structural adequacy for lift capacities in maintenance facilities

REQUIREMENTS

a) 4.7.1.1 A facility to allow prolonged storage of dry cell batteries used for COMMEL equipment will be PROVIDED. (2)

b) 4.7.1.3 The facility to be provided can be either a commercially available walk-in type freezer or a specially constructed building furnished with a cooling unit. (2)

c) 4.7.1.5 Shelving or storage racks shall be PROVIDED for storage of batteries within the facility. (2)

d) 4.7.1.6 The facility shall be PROVIDED with a locking system, emergency warning system to prevent anyone from becoming locked in, and interior and exterior temperature gauges as well as mechanical ventilation. (2)

CRITERIA

a) 4.7.1.4 If a specially constructed building is to be used, the walls and ceiling shall have a minimum "K" value of 0.488 K cal. m^2g c^o. The floor shall be concrete to avoid any deterioration due to broken batteries or other accidents while working with batteries. Concrete shall have acid-resistant finish. (2)

b) 4.7.1.2 The facility shall be capable of maintaining a maximum temperature of 4^o C at all times in order to insure the performance capability and freshness of the batteries. (2)

GUIDANCE

6.3 Dry cell batteries should not be stored at temperatures above + 75°F. Ideal storage temperature is - 35°F to + 35°F. (6)

REQUIREMENTS	CRITERIA
e) 3.5 The lighting system shall provide minimum illumination intensities as follows: (2)	e) 3.5.1 100 lux inside warehouses and storage buildings, measured at floor level. (2) e) 3.5.3 5 lux outside of all storage and administrative buildings at midpoint of lower edge of each door only. (2)
f) 4.2.1 An annex to each warehouse will be PROVIDED to house dehumidifying equipment. (2)	
g) 4.2.1 Necessary dehumidifier units will be PROVIDED. (2)	
h) 2.5.7.3 As a means of contributing to storage regularity and also to provide a desirable safety factor, warehouse aisle boundaries will be clearly identified by painted stripes. (3)	h) 2.5.7.3 The width of these stripes will not exceed 4 inches nor be reduced below 3 inches, and will be consistent throughout an installation's warehouses. White Gloss No. 17875, as identified in Federal Standard TT-C 595, and as required by AR 385-30 will be used for this purpose. Paint will conform to Federal Specification TT-P-115, Paint, Traffic, Highway. (3)

GUIDANCE

NOTES

RECEIVE/TURN-IN AND ISSUE COMMEL/HOLDING AREAS (INTERIOR AND EXTERIOR)

function/purpose

To receive, turn in, and issue equipment, and to temporarily store Commel equipment waiting for repair parts, quality assurance checks, etc.

issues and assumptions

This group of items consists of radios, accessory and installation kits, and telephone and teletype shelter assemblies that are mounted on vehicles. Equipment varies radically in quantity and price between unit sets. Almost all units are authorized one or more tactical radios, and most headquarters and signal units are authorized shelters of various sorts. Some components of mounts and shelters are expendable. All radios, mounts, and shelters are considered primary line items, are accounted for on the POMCUS property books, and are ordered by the CEGE Property Book Officer. Items are received at POMCUS site in depot level A pack, and are usually unpacked for maintenance, inspection, and storage. Mounts are currently installed in many tactical vehicles, as a result of either being received that way (in case of most tracked vehicles), or because of REFORGER issues. In NORTHAG, it may be assumed that tracked vehicles will be received with mounts, and that wheeled vehicles will not. Installation of radio mounts in wheeled vehicles depends upon the type of unit involved.

Radios are stored in a controlled humidity environment at present, and temperature changes have no effect on serviceability. Radios should be inspected annually, in conjunction with the annual visual inspection. The same rules apply to shelters. Uploading radios is dependent on developing a standard radio configuration by type unit. Therefore radios can not be uploaded at this time.

The kinds of signal equipment authorized in CEGE are not easily removed from vehicles once mounted, and are not really useful unless all installation items and accessory kits are used.

activities	personnel	equipment
1. Packing and unpacking.		1. 1 - Warehouse forklift. 2. 3 - Warehouse dollies. 3. 1 - Warehouse truck.
1. Exterior holding of equipment.		
1. Issue (REFORGER) a. Transfer of hand receipts.	1 - 76Z	1. Same as Receive Equip.
2. Loading of trucks.	As required	1. Open area for truck drive-through with two overhead doors on each side of main storage area.

requirements

1. A'-quate space.
2. Security.
3. Illumination.
4. Power.

criteria

1. 250 sq. ft.
2. 8 ft. security fence and double gate.
3. 5-lux exterior, 15-lux interior.
4. 110V adjustable cable for exterior and interior use.

guidance

1. Exterior holding area should have direct access to the wor' bays.
2. Equipment goes directly to storage facilities from receiving, or may go to holding area to await parts for necessary maintenance or repair.

DI 14

CE-2

COMMEL EQUIPMENT AND DRY CELL BATTERY STORAGE

function/purpose

Commel equipment and dry cell battery storage.

issues and assumptions

1. Uploading Commel equipment:

   If equipment is uploaded, most of the shelves listed for Activity 2 are not needed.

2. *Dry-cell battery storage unit:*

   Either a commercially available freezer unit or a building with cooling unit will be provided. Size of the facility will depend on the number of batteries to be stored and shall be specifically justified in each case.

   Certain dry cell batteries, however, do not require refrigeration and require open shelving only.

activities	personnel	equipment
1. Commel equipment location identification. 2. Shelving Commel. 3. Dry-cell batteries to storage.	LNs (as supply men).	1. Planograph. 2. (8 ea.) 84 ft. long x 4 ft. wide shelves for Commel. 3. (4 ea.) Push carts 5 ft. long x 3 1/2 ft. wide. 4. Battery shelving or storage racks in refrigerator unit. 5. Dehumidifier units.

requirements

1. Illumination.

2. Temperature:

   a. For coding dry-cell batteries.

   b. For Commel.

3. The refrigerator facility will have a locking system, an emergency warning system to prevent anyone from becoming locked in, and interior and exterior temperature gauges, as well as mechanical ventilation.

4. Efficient insulation for battery refrigerator.

5. Acid-resistant flooring.

criteria

1. 100 lux inside storage buildings, measured at floor level; 5 lux outside.

2a. Maximum temperature of 4° C all times.

2b. $18^{o}C$ during winter.

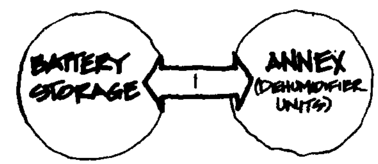
3. -

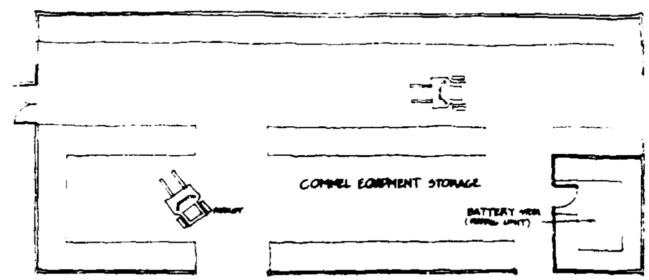
4. Walls and ceiling with a minimum "K" value of 0.4888 K cal.m^2g C^0.

5. The floor shall be concrete to avoid any deterioration due to broken batteries. Concrete shall have acid-resistant finish.

guidance

1. The battery facility to be provided can be either a commercially available freezer unit or a specially constructed building furnished with a cooling unit related to Commel storage and issue operations.





DI 14

CE-3

COMMEL TESTING ROOM

function/purpose

Store, test, and maintain Commel equipment.

issues and assumptions

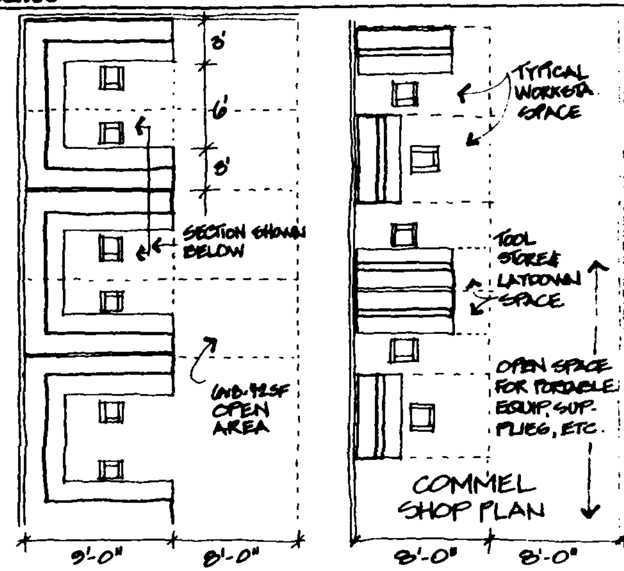
1. Commel space location:

   Because these functions must be concerned with cleanliness, they should be isolated from dirtier shop activities. Commel equipment security is a factor in space location, especially for device storage.

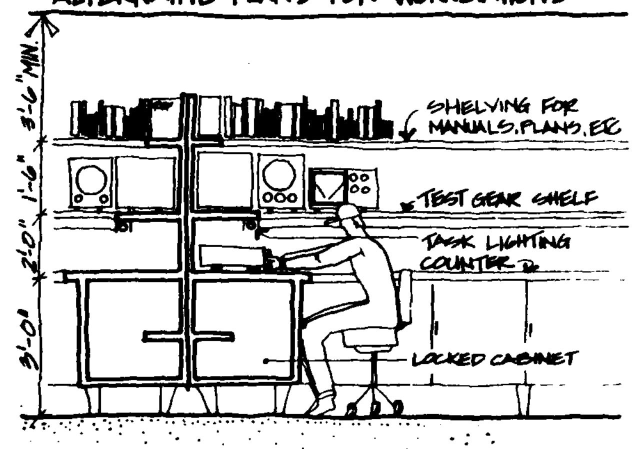
activities	personnel	equipment
1. Performance test each piece of equipment.	2 - Military maint. personnel. 3 - Maint. LNs.	1. 5 - Counter stations (5 1/2 ft. long x 3 1/2 ft. wide x 3 ft. high). 2. (2 each) Bookcase shelving. 3. (4 each) Multi-drawer shelving cabinets.
2. Maintain equipment.	Same as above.	4. (1) Bench (7 ft. long x 3 ft. wide x 3 ft. high). 5. File safe - 4-drawer.

requirements	criteria
1. Adequate space.	1. Approx. 70 sq. ft. per work station, with additional 42 sq. ft. per person for open multi-use space. (See Guidance.)
2. Illumination.	2. 500 lux ambient light, with supplemental task lighting to 800 lux.
3. Power.	3. 110V - (4 duplex outlets at each work bench). 24V (DC) special power Commel space.
4. Lockable doors.	4. 3-lock security system.
5. Roof mounted antenna. (With cable extending into Commel room.)	5. -
6. Working temperature.	6. 20°C during winter.

guidance



ALTERNATIVE PLANS FOR WORKSTATIONS



SECTION THROUGH WORKSTATIONS

CE-4 PRESERVATION WORKSHOP

function/purpose

To preserve equipment.

issues and assumptions

activities

1. Seal.
2. Apply preservation materials.
3. Painting.

personnel

The same people that do maint. and testing also use this area.

equipment

1. Work bench (30 in. x 72 in.).
2. Shelving (40 lin. ft.).
3. Supply cabinet (20 in. x 48 in. x 72 in. high).
4. Paint spray counter - 10 ft.
5. Spray gun.
6. Cleaning unit (see Cuidance).

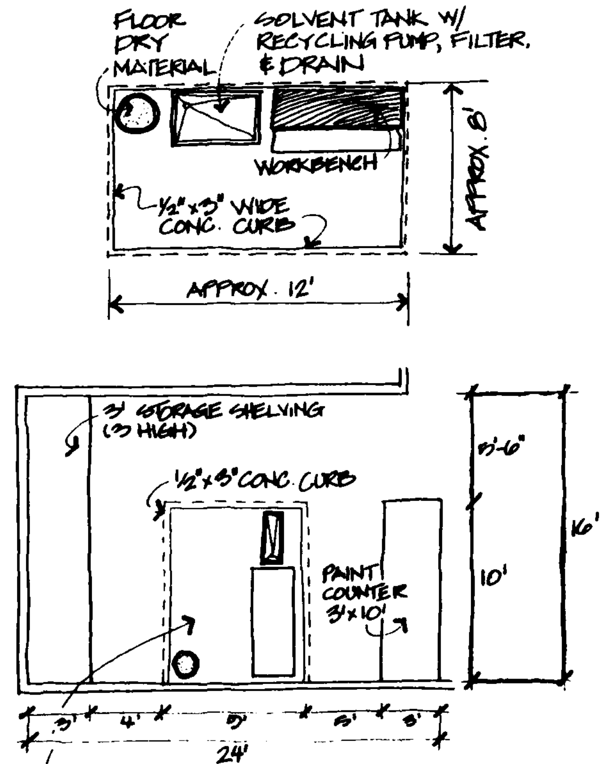
requirements	criteria
1. Adequate area.	1. Approx. 300 sq. ft.
2. Compressed air.	2. -
3. Power.	3. 110V service.
4. Thermal control for occupants.	4. 20°C. during winter.
5. Lighting.	5. 300 lux.
6. Ventilation for painting and cleaning.	6. 10 air changes per hour.

guidance

1. Parts cleaning station:

   a. Should be located out of circulation path and should not be fixed against a wall where the solvent and grease will contaminate the wall surface.

   b. No floor drain should be provided near the parts washer unit. Spills can be controlled on the floor surface and the solvent prevented from entering the sanitary sewer, storm sewer, or waste system.



PARTS CLEANING STATION

DI 14

CE-5

TOOL AND PARTS STORAGE

function/purpose

To store necessary repair parts and special tools.

issues and assumptions

activities

1. Receiving.
2. Inspection/inventory.
3. Storage/placement.
4. Issuing (check-out).

personnel

equipment

1. Desk with chair (table required if desk and chair are at other location).
2. File cabinet - 5-drawer.
3. Parts, binds, shelving.
4. Additional equipment may be needed to move parts and position them in the storage area, and to dispense them.
5. Microfiche viewer.
6. Chalkboard, 4 ft. x 4 ft.
7. Locked cabinet (18 in. x 48 in. x 72 in. high).
8. Peg boards (40 in. x 96 in.)
9. Cabinet with small drawers.
10. Bench with shelf.

requirements

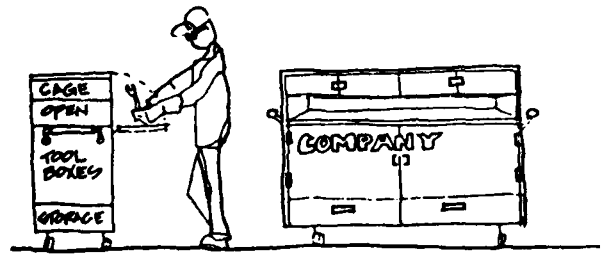
1. Adequate size.
2. Environmental control.
3. Illumination.
4. Check-out window.
5. Double doors, located in an exterior wall (or to a dock) for movement of parts into and out of the building.
6. Adjustable loading dock.
7. Communications.
8. Power.
9. Room must be lockable.

criteria

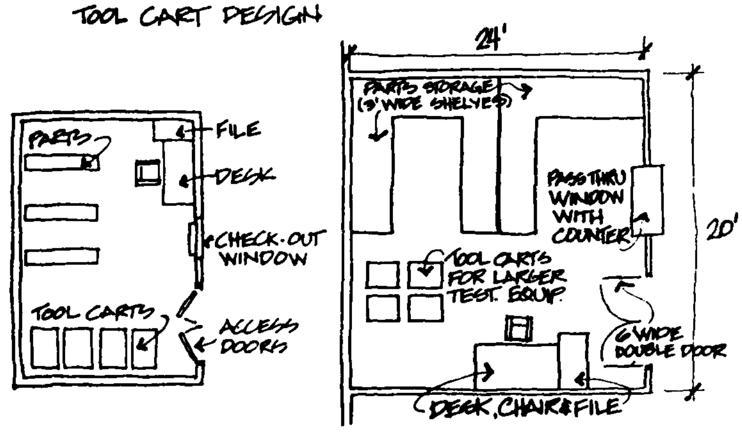
1. A minimum size should be determined and specified based on number and size of tools, bench stock, tool boxes and the like.
2. $20^{o}C$ during winter.
3. 400 lux at vertical shelving.
4. 3-ft. x 3-ft. area -- may be as dutch-door (accessible to/from bays).
5. 6-ft. opening width.
6. 3 ft., 10 in. high at receiving/issuing points.
7. Telephone.
8. 110V outlet in each wall.
9. -

guidance

Each person (or 2 to 3 people) could have a cart similar to that shown in the sketch, or the shop could have one or two large carts where tool boxes could be secured.



TOOL CART DESIGN



TYPICAL PLANS

DI 14

CE-6

OFFICE/INVENTORY CONTROL

function/purpose

To supervise all personnel, maintenance, and preservation work and storage inventory procedures.

issues and assumptions

activities

1. Records of transactions section.
2. Inventory records.
3. Supervision/control.

personnel

1. Commel maintenance supervisor.

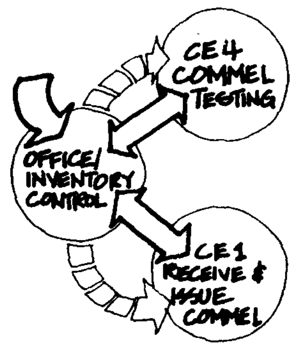
equipment

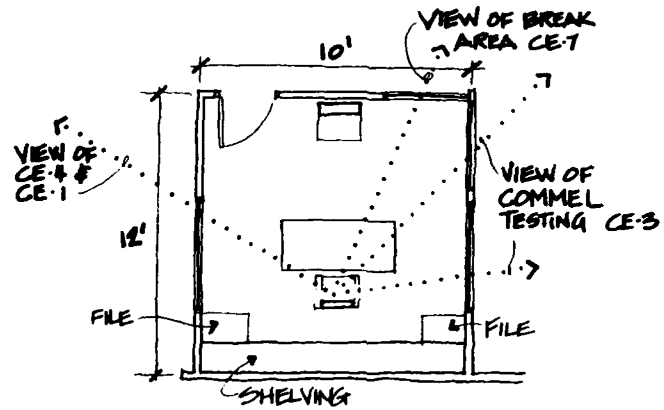
1. 1 - Desk with chair.
2. 20 lin. ft. of bookshelves.

requirements	criteria
1. Adequate space.	1. Approximately 80 to 90 sq. ft. per workstation, plus equipment.
2. Power.	2. 110V service power.
3. Lighting.	3. 500 lux with fluorescent fixtures.
4. Heating, cooling, ventilation.	4. 20^{0}C during winter; ventilation -- 10 air changes per hour.
5. Access.	5. Door to outdoors, door to testing area.
6. Security of records.	6. Room must be lockable.
7. Communications.	7. Telephone intercom to shop and storage areas.

guidance

1. The supervisory personnel must be able to observe the work areas from the office area. This can be done with windows in office walls.





DI 14

CE-7

PERSONNEL LOCKER/BREAK AREA/LATRINES

function/purpose

To accommodate personnel break periods, hygiene activities, and clothes changing.

issues and assumptions

1. Water consumption:

   In some locations, reducing water consumption is important. On military facilities, the installation of water-saving devices in latrines would reduce the amount of water that is used without affecting the operation of the equipment. This is especially important in geographic areas where water supplies are dwindling; in addition, it reduces water supply costs at all military installations.

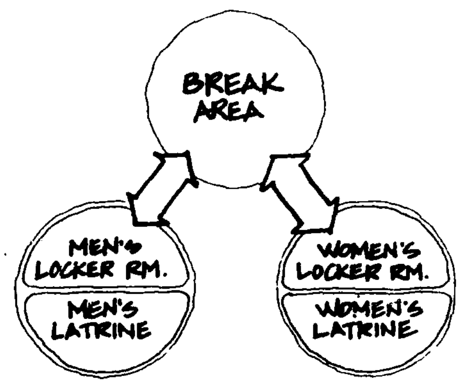
activities	personnel	equipment
1. Breaks.		1. Tables with side chairs. 2. Vending machines. 3. Drinking fountain.
2. Personal storage.		1. Lockers. 2. Benches. 3. Wastebaskets.
3. Hygiene.		1. Wash basins/soap holders. 2. Showers (need special justification). 3. Urinals/water closets. 4. Mirrors. 5. Paper towel holders. 6. Wastebaskets.

requirements	criteria
1. Adequate size. 2. Smoking area ventilation (must be physically separated from vehicle bays). 3. Power. 4. Water sources for drinking fountain and coffee machines. 5. Illumination. 6. Communication.	1. Approximately 15 to 20 sq. ft. per person. 2. Ventilation -- 10 air changes/hr. 3. Provide one 120V-20A duplex receptacle for each vending machine. Minimum of 1 each wall. 4. -- 5. 500 lux, fluorescent ceiling fixtures, with one fixture at rear of space switched separately for minimum light level for AV presentations. 6. 1 wall telephone.
1. Adequate size. 2. Temperature. 3. Ventilation. 4. Illumination.	1. Space allocation: A minimum size should be determined and specified based on number. 2. Winter: $20^{o}C$. 3. 5 air changes/hour. 4. 250 lux.
1. Illumination. 2. Power. 3. Plumbing fixtures. 4. Temperature. 5. Adequate ventilation. 6. Adequate size.	1. 250 lux. 2. 110V at least 24 in. above finished floor; (1, 20A duplex/wall). 3. Provide water closets, urinals, and wash basins. Install water-saving devices in water closets, faucets, and showers. 4. Winter -- $20^{o}C$. 5. 5 air changes/hour. 6. Space allocation: A minimum size should be determined and specified based on number.

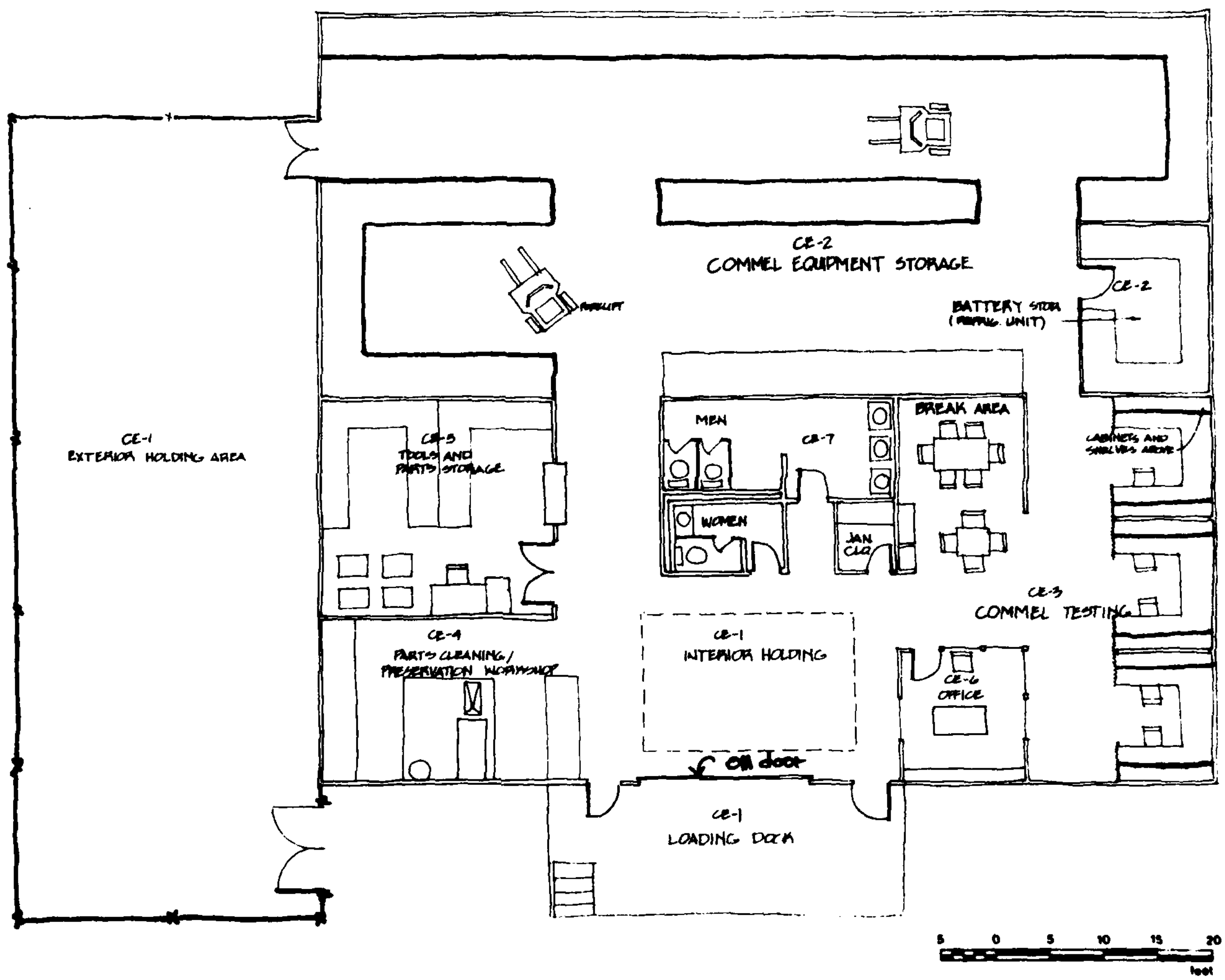
guidance

1. Use fluorescent fixtures for lighting.
2. Latrines should be centrally located and accessible from exterior and interior work areas.
3. Latrines should be provided in each inhabited building within a complex.
4. Latrines should be located in the parts of the building constructed as shop or office areas.

There are a number of different types of water-saving devices produced by commercial manufacturers that can be installed in water closets, faucets, and showers.



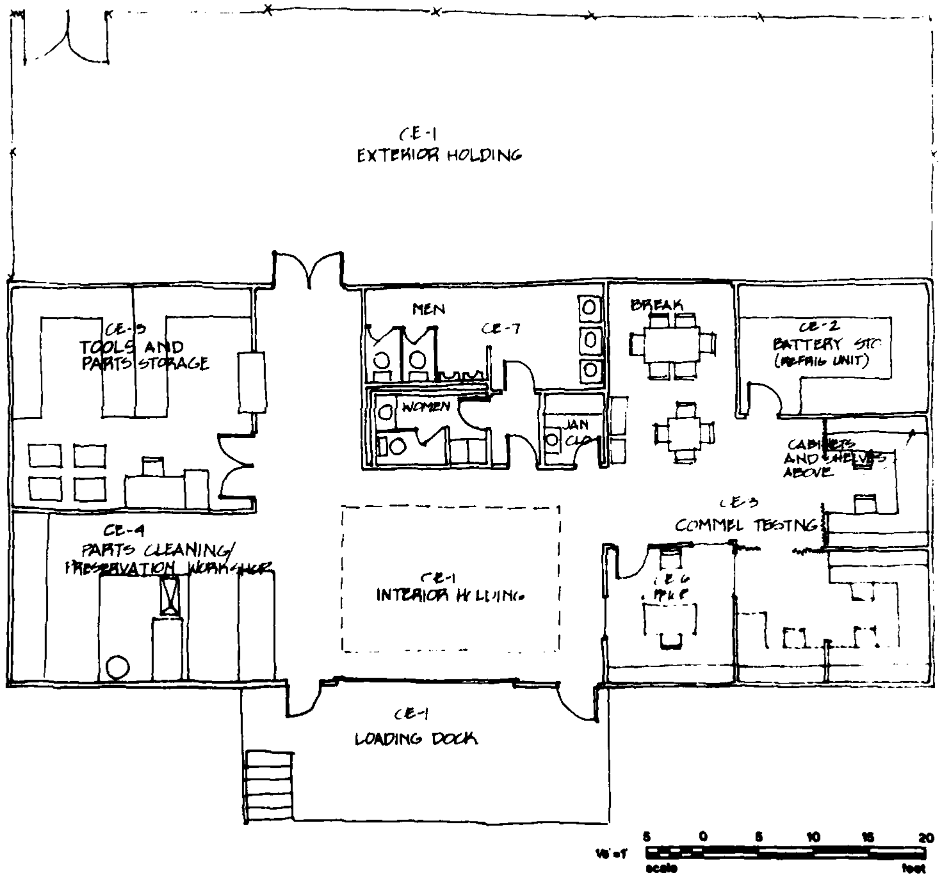
NOTES



CE-1
EXTERIOR HOLDING AREA
CE-2
COMMEL EQUIPMENT STORAGE
FORKLIFT
CE-2
BATTERY STOR
(REFRIG. UNIT)
CE-5
TOOLS AND
PARTS STORAGE
MEN
CE-7
BREAK AREA
WOMEN
JAN
CLO
CABINETS AND
SHELVES ABOVE
CE-4
PARTS CLEANING/
PRESERVATION WORKSHOP
CE-1
INTERIOR HOLDING
CE-3
COMMEL TESTING
CE-6
OFFICE
OH door
CE-1
LOADING DOCK
5 0 5 10 15 20
feet

Facility Layout Concept

COMMEL Maintenance



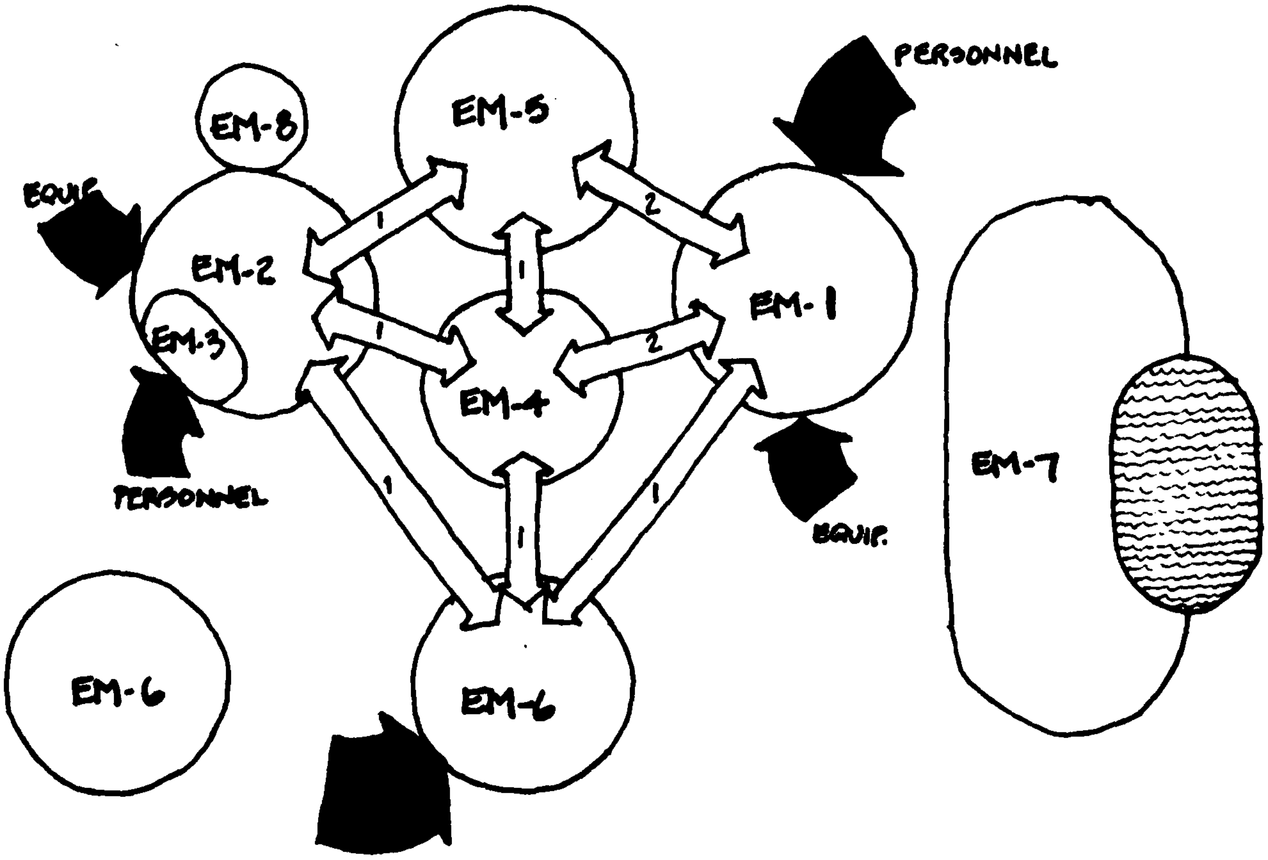
Engineering Equipment Maintenance

Literature Information

Non-Mech/COMMEL/Engineering Maintenance/Preservation Bldg. 15.2

User Information

EM-1 Light Engineer Equipment Maintenance Bay 15.6
EM-2 Heavy Engineer Vehicle Maintenance Bay 15.8
EM-3 Parts and Tool Storage 15.10
EM-4 Office 15.12
EM-5 Break Area/Locker/Latrine 15.14
EM-6 Exterior Holding Areas and Receiving Area 15.16
EM-7 Test Track and Water Pond 15.18
EM-8 Facility Maintenance Storage 15.20
Facility Layout Concept



PURPOSE

9.1 This building shall be PROVIDED for the receiving, holding, testing, maintaining, and preservation of non-mechanical engineer equipment and COMMEL equipment. (2)

ISSUES and ASSUMPTIONS

5.2 If the primary water supply required to satisfy the above demand is inadequate, or is not available, ground level storage points, or open tanks will be PROVIDED. (2)

9.2 Additional requirements for special equipment as well as the number and sizes of buildings provided at each site will depend on units served and will be specifically justified in each case. (2)

1. Examination and evaluation of existing structures (11):

If existing buildings are being considered for reuse as POMCUS facilities it is necessary to analyze the renovation costs against "new construction" costs. Major costs have been required to make existing buildings responsive to POMCUS activities; expecially,

1) adequate insulation for temperature controlled buildings,

2) structural adequacy for lift capacities in maintenance facilities.

REQUIREMENTS

a) 9.1 A Non-Mechanical/Commel/Engineering Maint./Preservation Building will be PROVIDED and will contain a parts and tool storage room, small parts care and preservation room, and a spray painting booth. (2)

b) 9.3 A testing room for COMMEL equipment will be PROVIDED and contain shielding from radio frequency of low output. This is to allow proper adjustment of equipment without exterior interference. (2)

c) 9.6 A derust dip tank, sand blasting area, lubrication dip tank, marine equipment testing tank, and a monorail conveyor to transport small parts through the various testing and preservation facilities shall be PROVIDED. (2)

d) 9.7 A loading dock and shelving in the parts and tool storage rooms and small parts care and preservation rooms shall all be PROVIDED. (2)

e) 9.8 Centralized compressed air system shall be PROVIDED to run the paint sprayers, perform cleaning functions, and for pneumatic tool operations. (2)

CRITERIA

d) 9.7 Loading dock shall be 13.7m X 3.0m with levelers. (2)

GUIDANCE

REQUIREMENTS

f) 9.10 Appropriately designed acoustical shielding shall be installed. (2)

g) 9.9 Wet pipe sprinkler system shall be PROVIDED for fire protection due to the use of paints, cleaning fluids, and other volatile liquids. (2)

h) 9.10 The engineering maintenance area shall be PROVIDED with an engine exhaust system to allow test running of generators and the like, within the building. (2)

i) 9.11 Ventilation system shall be capable of preventing the buildup of noxious fumes within the shop areas to reduce threat of explosion or poisoning. (2)

j) 9.12 Locker rooms containing toilets and showers for personnel shall be PROVIDED. (2)

k) 1.4 Offices and shops not having natural ventilation will have mechanical ventilation. (2)

l) 5.1.2 A water distribution system for domestic and industrial usage will be PROVIDED ensuring an adequate rate of flow to all maintenance facilities. (2)

CRITERIA

f) 9.5 Walls and ceilings of each test room will be acoustically treated to depress engine noise levels to 85 dB. (2)

i) 9.11 System shall provide 20 air changes per hour within these areas assuming an artificial ceiling height of 3 meters. (2)

k) 1.4 System shall provide ten air changes per hour, unless otherwise noted. (2)

GUIDANCE

REQUIREMENTS

m) 3.5 The lighting system shall provide minimum illumination intensities as follows: (2)

n) 9.4 The facility will be PROVIDED with a secured, paved, exterior holding area. (2)

CRITERIA

m) 3.5.2 250 lux inside of all maintenance, guard and administration facilities. (2)

n) 9.4 Area shall be 250 sq meters for engineer equipment awaiting service. (2)

GUIDANCE

DI 15

EM-1
LIGHT ENGINEER VEHICLE MAINTENANCE BAY

function/purpose

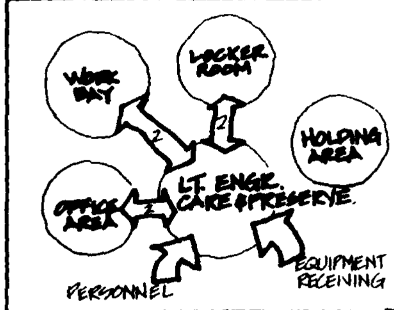
To perform maintenance, preservation, and repair on light engineer equipment, such as compressors, generators, motors, etc.

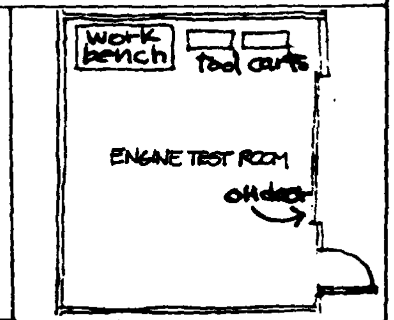
issues and assumptions

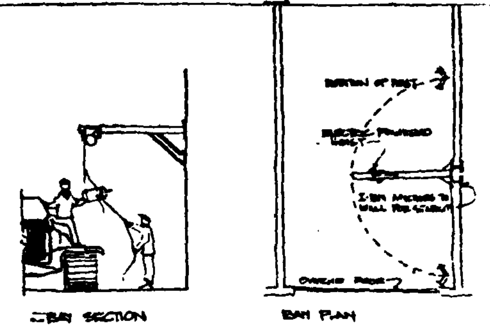
activities	personnel	equipment
1. Bring equipment to shop. 2. Perform organizational and direct support maintenance on equipment.	3 - mechanic. 2 - mechanic's helper.	1. 1-1 -ton overhead crane. 2. 5 - wooden workbench with vice. 3. Degreaser, parts cleaning 4. 5 - Engine test machine. 5. 5 - master mechanic tool box. 6. 5 - general mechanic tool box. 7. PA system. 8. Eyewash fountain.
3. Preserve (paint and lube) light engineer equipment.		1. Compressor and paint sprayer; oil spray unit. 2. Workbench (3 ft. x 6 ft.). 3. Solvent and waste containers.

requirements	criteria
1. Bay area for five equipment testing rooms.	1. 3 ft. x 69 ft. (see "Guidance" sketch for typical test room).
2. Overhead door to outside and personnel door for each bay.	2. Powered horizontal door (15 ft. x 18 ft. high); personnel door (3 ft. x 7 ft.).
3. Power.	3. 110V, 220V, 440V adjustable AC current.
4. Overhead fluid-dispensing unit.	4. Transmission oil, gear oil, water, compressed air, engine oil (2 grades) and hydraulic fluid.
5. Wastewater pretreatment for sanitary sewer drain in bays.	5. -
6. Equipment exhaust system.	6. -
7. Working temperature.	7. 20^{o}C. during winter.
8. Lighting.	8. General lighting (300 lux) with retractable trouble lights.
9. Non-skid floor surface.	9. Class 5 concrete slab (ACI).
10. Overhead hoist.	10. 1 metric ton capacity. (See "Guidance")
12. *Parts cleaning workstation.*	11. *Ventilation of 10 air changes per hour.*
11. Moisture removal and control system.	12. (See OM-7 sheets).

guidance





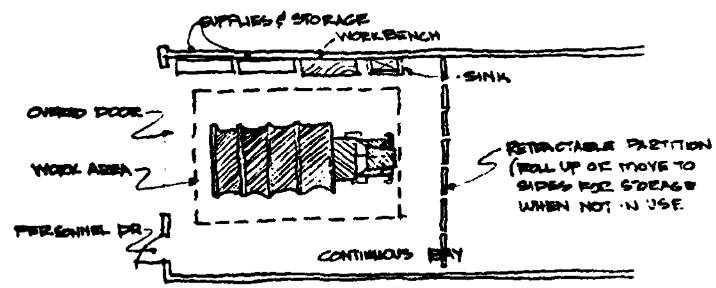


ADDITIONAL PARTS PIVOT HOIST

requirements	criteria
1. Adequate space, as part of a drive-through double bay.	1. *Approximately 20 ft. x 32 ft.*
2. Compressed air.	2. -
3. Good task lighting.	3. 500 to 750 lux (for specific areas of a vehicle while being painted).
4. Ventilation with exhaust.	4. Neg. air pressure through an exhaust system.
5. Fire extinguisher.	5. -
6. Service sink.	6. Cold water.
7. Bay separation.	7. Noncombustible partition meeting OSHA and NFPA requirements.

guidance

1. Partial to *full enclosure* is necessary to control fumes and external dust.



PAINT BAY

DI 15

EM-2

HEAVY ENGINEER VEHICLE MAINTENANCE BAY

function/purpose

To perform vehicle maintenance, preservation, and repair on heavy engineer vehicles.

issues and assumptions

1. Scheduled maintenance on engineer equipment can be performed more efficiently and provide for positive pollution control if the proper inclosed facilities and equipment are provided.

2. It is desirable to be able to remove crankcase and transmission oils in tracked equipment with either the power packed in or removed from the vehicles.

3. Inspection pit usage vs. exterior grease racks:

a. Oil and grease racks are inadequate because (1) they cannot be used in inclement weather, (2) are not designed for the convenience of the user, and (3) result in significant oil and grease spills.

b. "Oil and greasing" pit(s) would be provided centrally in the shop for use by all. The number required is dependent on a pit's capacity to support vehicle servicing at an adequate rate, probably two per shop.

activities

HEAVY ENGR. STOCK:

1. Oil and oil filter changing for wheeled and tracked equipment.
2. Fluid level checks.
3. Radiator flushing for water-cooled engines.
4. Power pack removal.
5. Power pack cleaning.
6. Hull cleaning.
7. Tire changing.
8. Greasing and lubrication for wheeled and tracked equipment.
9. Ground-hopping of tracked equipment.
10. Power pack replacements.
11. Large component parts cleaning (heatshields, fuel cells, etc.).

personnel

5 - mechanics.

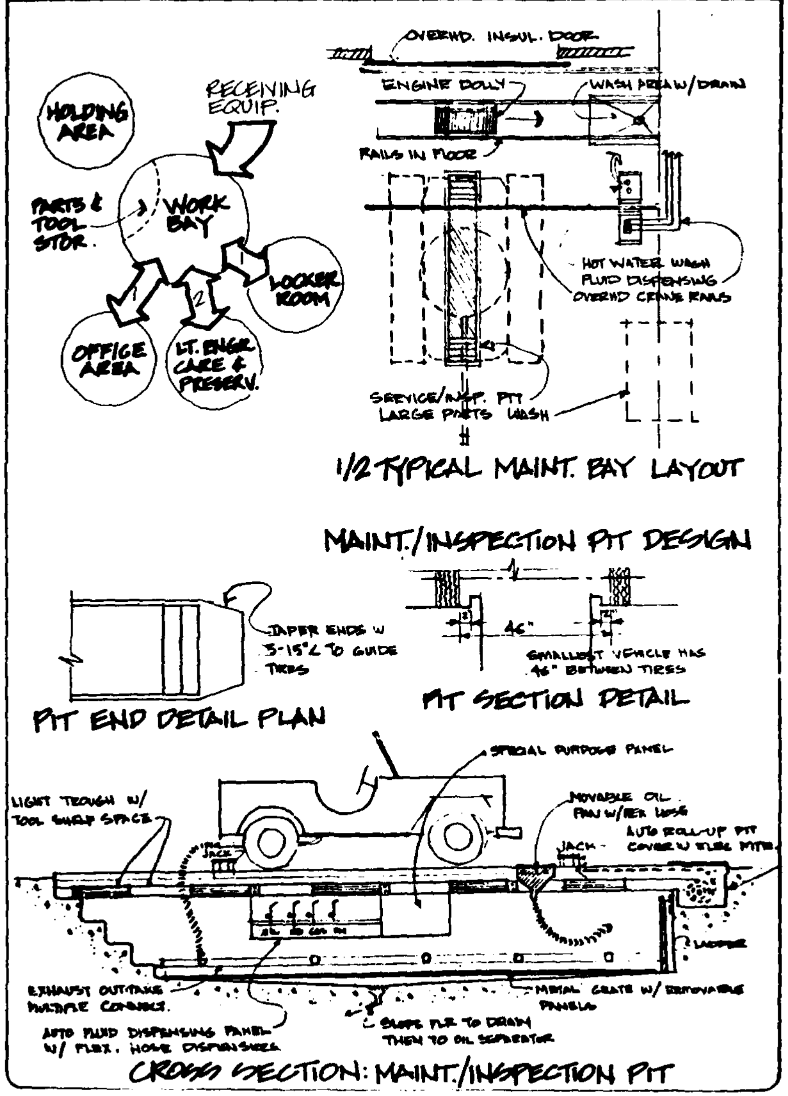
5 - mechanic's helpers.

equipment

1. 5 - master mechanic tool boxes.
2. 5 - general mechanic tool boxes.
3. 1 - shop set no. 3.
4. 20 metric ton overhead crane.
5. 6 - wooden workbenches with vises.
6. 1 - degreaser.
7. 15 CFM electric air compressor.
8. 6 - overhead oil and grease dispensers.
9. 1 - fuel injector and pump test stand.
10. 2 - portable engine stands.
11. 2 - portable transmission stands.
12. 6 - 10 metric ton floor jacks.
13. 2 - portable steam cleaners.
14. Movable sliding waste oil collection funnels side-discharging to waste oil collection trough.
15. Floor jacks, either portable or fixed in floor.
16. Power pak dollies.
17. Solid waste storage.
18. Recirculating small parts solvent washer.
19. PA intercom speakers.
20. 2 - eyewash fountains.

	requirements	criteria
1.	Adequate space to meet the service requirements of several tracked or large wheeled vehicles simultaneously.	6 - 16 ft. x 40' ft. bays.
2.	Vehicle and personnel access.	Bays to have drive-through capability; 15 ft. wide x 20 ft. high horizontal vehicle doors to be motorized; personnel doors (3 ft. x 7 ft.).
3.	Electrical power.	110V, 220V, 440V adjustable AC current.
4.	Retractable dispensing lines for servicing vehicles.	Transmission oil, gear oil, water, compressed air, 2 grades of lubricating oil, and hydraulic fluid.
5.	Wastewater pretreatment with discharge to sanitary sewer.	-
6.	Waste receptor systems.	Solid waste receptacles, waste solvent collection sewer, and waste oil collection to outside underground waste oil storage.
7.	Light on all vehicle exterior surfaces.	300-lux mercury vapor lamps with retractable trouble lights.
8.	Two-position vehicle exhaust system at each bay.	-
9.	Moisture removal and control system.	Ventilation of 10 air changes per hour.
10.	Lift capability.	20 metric ton capacity traveling bridge crane structure.
11.	Temperature.	20°C. during winter.
12.	Service pits.	2 - one each in end of center of two bays (see OM-3 sheets).
13.	Non-slip floors.	Concrete.
14.	Parts cleaning workstation.	(See OM-7 sheets.)

guidance



DI 15

EM-3

PARTS AND TOOL STORAGE

function/purpose

Tool control, tool box and bench stock storage.

issues and assumptions

1. A **minimum** space *should always* be allocated to secure tool boxes. The space allocation should be based on the size and number of tools and tool boxes, not just on the number of personnel. Personnel will always need a place to lock up their tools. The number and size of the tools and the number of tool boxes will depend on the type of vehicles being maintained and the number of personnel assigned to the maintenance function.

activities

1. Receiving.
2. Inspection/inventory.
3. Storage/placement.
4. Issuing (check-out).

personnel

1. Local national.

equipment

1. Desk with chair.
2. File - 4-drawer.
3. Chalkboard, 4 ft. x 4 ft.
4. Locked cabinet (18 in. x 48 in. x 72 in. high).
5. Pegboards (40 in. x 96 in.).
6. Cabinet with small drawers.
7. Bench with shelf.

requirements

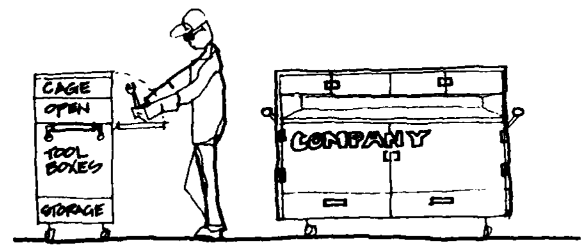
1. Adequate size.
2. Illumination.
3. Dutch door to dispense tools.
4. Communications.
5. Power.

criteria

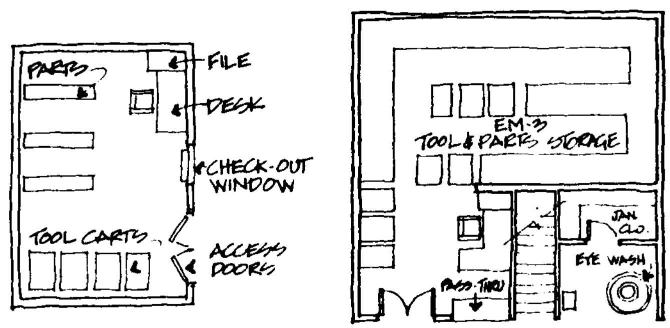
1. A minimum size should be determined and specified based on number and size of tools, bench stock, tool boxes, etc., assigned to the unit, determined by the vehicles maintained.
2. 400 lux - fluorescent light fixtures.
3. 3-ft. door.
4. Telephone.
5. 110V outlet each wall.

guidance

1. Each person (or 2 to 3 people) could have a cart similar to the sketch, or the shop could have a large cart or two where tool boxes could be secured. (It might be possible to provide enough space on 1 or 2 carts to keep some supplies and PLL items.)
2. The carts could also be secured in the tool room, and thus be ready for daily use.



TOOL CART DESIGN



TYPICAL PLANS

DI 15

EM-4 OFFICE

function/purpose

Administration of maintenance operations.

issues and assumptions

activities

1. Supervision/control.
2. Recordkeeping.
3. Job order processing.
4. Library of reference manuals.

personnel

1. Military -- Supervisor.
2. Local national -- supervisor.

equipment

1. 2 desks with chairs.
2. 2 files - 4-drawer.
3. 1 cabinet, 18 in. x 48 in. x 60 in. high.
4. 2 bookcases, 15 in. x 48 in. x 72 in. high.

requirements

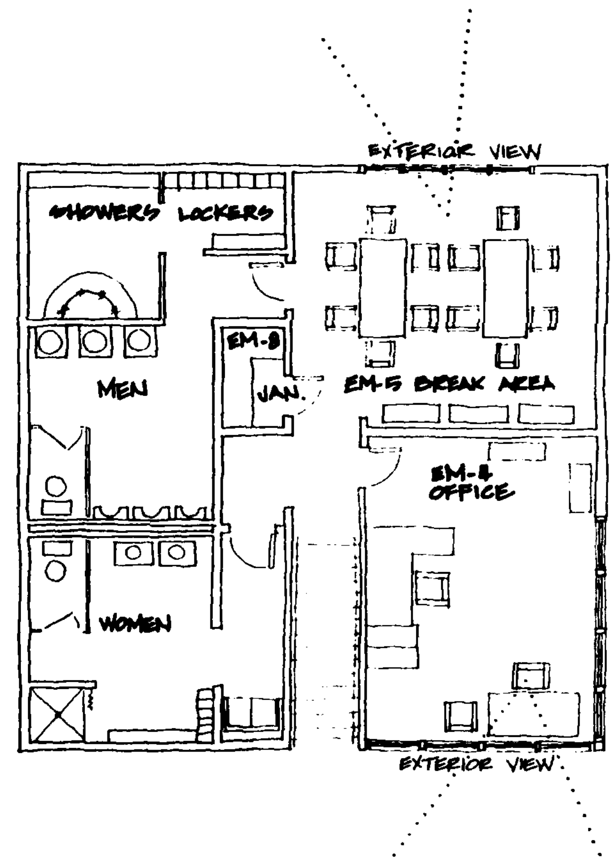
1. Adequate space.
2. Power.
3. Lighting.
4. Heating, cooling, ventilation.
5. Communication.

criteria

1. 80 to 90 sq. ft. per person with additional space for equipment and files.
2. 110V duplex outlets at each 10 ft. of wall.
3. 500 lux with fluorescent fixtures.
4. 20^{o}C.
5. Coordinate telephone and intercom needs with the installation.

guidance

1. The supervisory personnel must be able to observe the work areas.



EM-5
BREAK AREA/LOCKER/LATRINE

function/purpose

Latrines, Showers, and Locker Rooms for Facility Personnel Use.

Personnel Training and Work Break Activities. A break, training, and conference area should be provided at a central location in the building where persons can assemble for daily work breaks and periodic group training sessions.

issues and assumptions

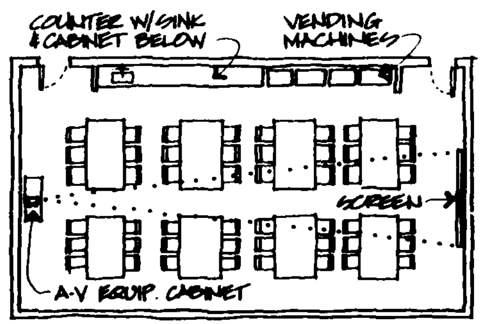
Toilet facilities shall be provided for men and women:

1. Water consumption: In some locations, reducing water consumption is important. On military facilities, the installation of water-saving devices in latrines would reduce the amount of water that is used without affecting the operation of the equipment. This is especially important in geographic areas where water supplies are dwindling; in addition, it reduces water supply costs at all military installations.

2. Flexibility of Break, Training Facilities:

Adequate space (area) for breaks, training, and/or conferences is required. Most facilities have fixed-wall construction on interior walls. Movable walls would allow flexibility in space allocation.

activities	personnel	equipment
1. Washing. 2. Eliminating. 3. Self-grooming. 4. Personal storage.	All the personnel assigned to the facility; visitors.	1. Wash basins/soap holders. 2. Showers. 3. Urinals/water closets. 4. Mirrors. 5. Paper towel holders. 6. Lockers, benches. 7. Wastebaskets.
1. Training classes. 2. Breaks. 3. Conferences.	Could include all personnel working in the building, probably in groups of 20 percent of assigned maximum.	1. Tables with side chairs. 2. Vending machines. 3. Drinking fountain.

requirements	criteria	guidance
1. Illumination. 2. Power. 3. Plumbing fixtures. 4. Temperature. 5. Adequate ventilation. 6. Adequate size.	1. 250 lux. 2. 110V at least 24 in. above finished floor; (one 20A duplex/wall). 3. Provide water closets, urinals, and wash basins. Install water-saving devices in water closets, faucets, and showers. 4. 20^{o}C during winter. 5. 4 air changes per hour. 6. Space allocation. Men / Women Latrine 225 / 150 Locker Room 750 / 200 Shower Room 150 / 50	1. Use fluorescent fixtures for lighting. 2. Latrines should be centrally located and accessible from exterior and interior work areas. 3. Latrines should be provided in each inhabited building within a complex. 4. Latrines should be located in the parts of the building constructed as shop or office space. There are a number of different types of water-saving devices produced by commercial manufacturers that can be installed in water closets, faucets, and showers. 5. See OM-16 sheets for typical plan layouts.
1. Adequate size. 2: Smoking area ventilation (must be physically separated from vehicle bays). 3. Power. 4. Water sources for drinking fountain and coffee machines. 5. Illumination. 6. Communication. 7. AV screen.	1. Approximately 1200 sq. ft. 2. Ventilation - 10 air changes per hour. 3. Provide one 120V-20A duplex receptacle for each vending machine. Minimum of one on each wall. 4. -- 5. 500-lux, fluorescent ceiling fixtures, with one fixture at rear of space switched separately for minimum light level for AV presentations. 6. One wall telephone. 7. 8-ft. x 8-ft. pulldown screen.	1. Example: A room 35 ft. x 35 ft. (or 1225 sq. ft.) will provide adequate space for tables and chairs, plus some standing room or space for vending machines and adequate distance for AV presentations. 2. The use of second-floor space for office area, conference rooms, etc. would release area on the ground floor for other activities.  TYPICAL BREAK/TRN'G ROOM

DI 15

EM-6

EXTERIOR HOLDING AREAS AND RECEIVING AREA

function/purpose

To receive engineering equipment initially and hold it for turn-in processing after REFORGER exercises or while awaiting parts.

issues and assumptions

activities

1. Uncrate and deprocess paper work transfer.
2. Initial activation of equipment to verify acceptability.

personnel

2 persons.

equipment

1. Fuel truck (near holding area).
2. Forklift unit with 6000-lb. capacity.

requirements

1. Exterior hardstand area.
2. Interior receiving area.
3. Illumination.
4. Power.

criteria

1. Concrete apron around facility approximately 90 ft. wide.
2. Approximately 1-bay size -- 48 ft. x 32 ft.
3. 5-lux exterior, 15-lux interior.
4. 110V adjustable cable for exterior and interior use.

guidance

1. Exterior holding area should have direct access to the work bays.
2. Equipment goes directly to storage facilities from receiving, or may go to holding area to await parts for necessary maintenance or repair, both EM-1 and EM-2.

DI 15

EM-7
TEST TRACK AND WATER POND

function/purpose

To adequately test vehicles and equipment both initially and after repair operations.

issues and assumptions

activities	personnel	equipment
1. Technical inspection of all vehicles.	As required.	1. Weight load unit to 25 tons. 2. Weight load test stand (30 tons).

requirements	criteria	guidance
1. Adequate area dirt track/field.	1. Approximately 2-acre field area.	1. Other vehicle maintenance and repair units may also use these areas for "field condition" testing.
2. Water pond.	2. Approximately 50 ft. wide, 100 ft. long, 20 ft. deep (1/2 sand and 1/2 mud bottom).	

DI 15

EM-8

FACILITY MAINTENANCE STORAGE

function/purpose

Storage of floor dry, clean and dirty shop towels, etc. (janitor's closet).

issues and assumptions

activities

1. Receiving
2. Inspection.
3. Placement.
4. Storage/inventory.
5. Dispensing.

personnel

None.

equipment

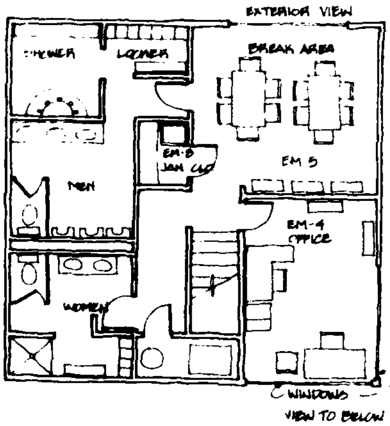
1. Shelves. (20 lin. ft.).
2. Containers with lids (clean 55-gal. drums).
3. Service sink.
4. Hooks.

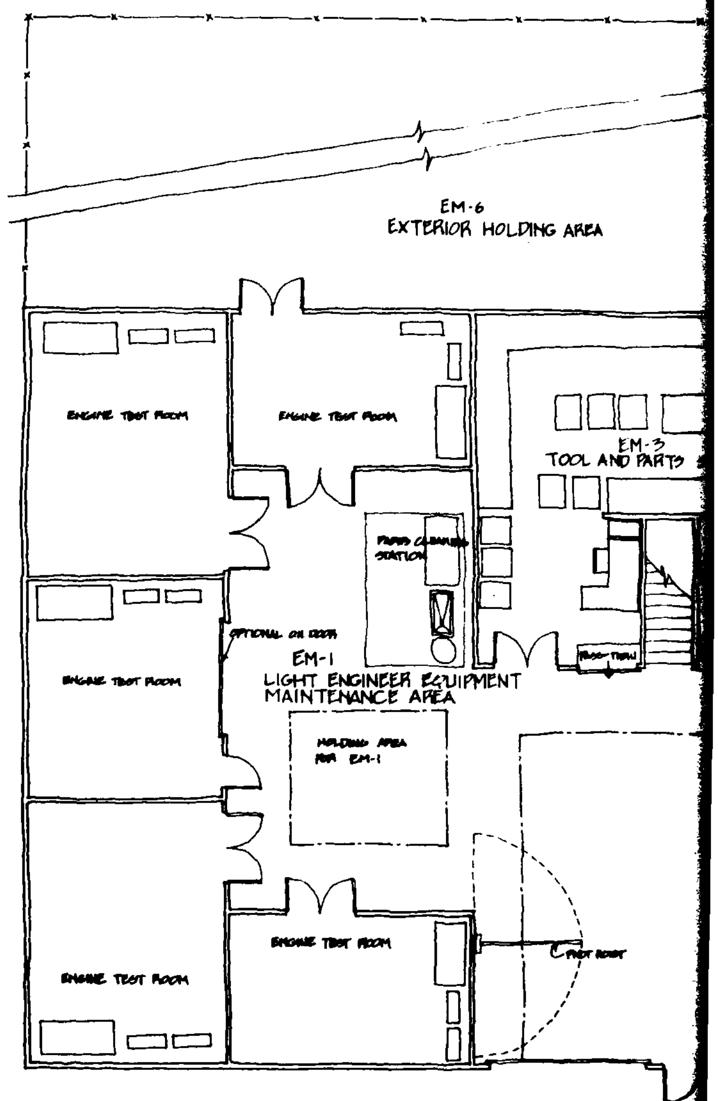
requirements	criteria	guidance
1. Adequate size.	1. 70 to 100 sq. ft. Minimum space to accommodate requirements based on size and number of items to be stored.	1. Location: Should be central to common use areas of the facility and have access to general circulation near the tool room and latrine. Clean towels can be dispensed through the tool room. The floor drying compound and the dirty towel containers (drum) can be located outside the tool room. Brooms, mops, cleaning supplies, etc., should be secured in the "janitor's closet."
2. Illumination.	2. 100 lux (use incandescent fixtures).	
3. Service sink	3. Hot and cold water.	
4. Environmental control.	4. 20°C during winter.	

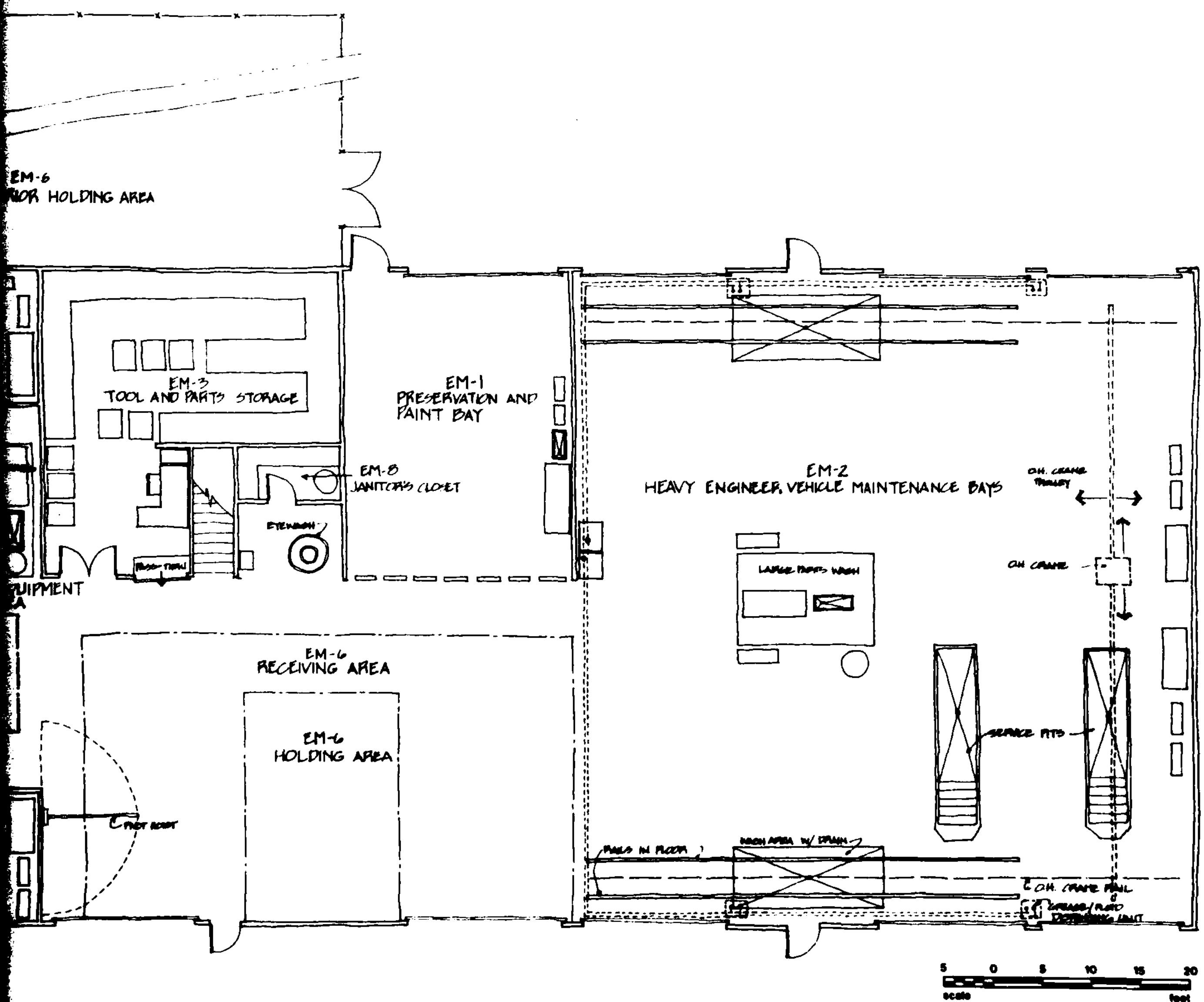
NOTES

Facility Layout Concept

Engineering Equipment Maintenance





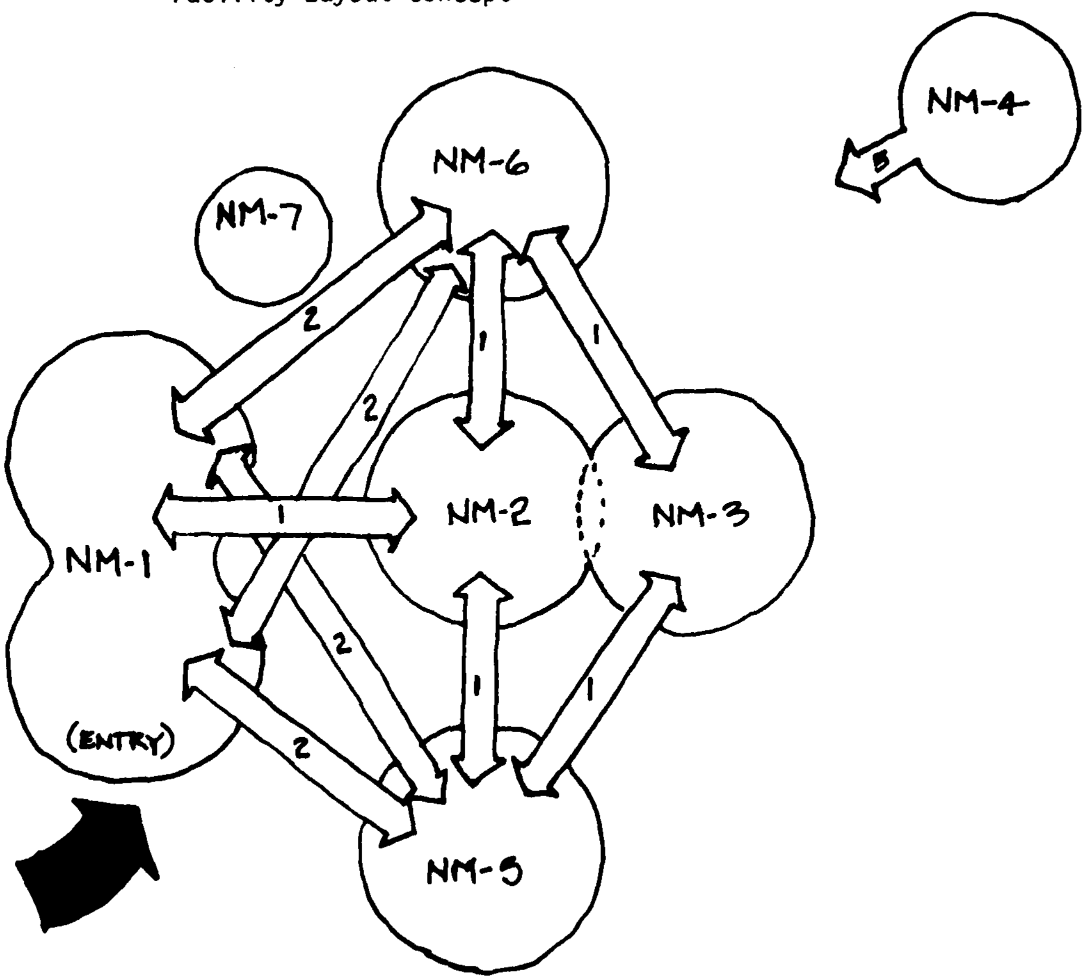

EM-6
HOLDING AREA
EM-3
TOOL AND PARTS STORAGE
EM-1
PRESERVATION AND
PAINT BAY
EM-8
JANITOR'S CLOSET
EYEWASH
EM-2
HEAVY ENGINEER VEHICLE MAINTENANCE BAYS
O.H. CRANE TROLLEY
O.H. CRANE
LARGE PARTS WASH
SERVICE PITS
RAILS IN FLOOR
WASH AREA W/ DRAIN
O.H. CRANE RAIL
EM-6
RECEIVING AREA
EM-6
HOLDING AREA
EQUIPMENT
5 0 5 10 15 20
scale feet

Literature Information

Non-Mechanical/Commel/Engineering Maintenance/ Preservation Building	16.2
Controlled Humidity Warehouses	16.6

User Information

NM-1	Loading Dock and Holding Area	16.10
NM-2	Work Bay for Non-Mech. Equipment	16.12
NM-3	Non-Mech. Equipment Storage Area	16.14
NM-4	Equipment Turn-in Area/REFORGER	16.16
NM-5	Administrative Office Area	16.18
NM-6	Break Area/Locker/Latrine	16.20
NM-7	Maintenance Supply Storage	16.22
	Facility Layout Concept	



PURPOSE

9.1 This building shall be PROVIDED for the receiving, holding, testing, maintaining, and preservation of non-mechanical engineer equipment and COMMEL equipment.(2)

ISSUES and ASSUMPTIONS

5.2 If the primary water supply required to satisfy the above demand is inadequate, or is not available, ground level storage points, or open tanks will be PROVIDED. (2)

9.2 Additional requirements for special equipment as well as the number and sizes of buildings provided at each site will depend on units served and will be specifically justified in each case. (2)

1. Examination and evaluation of existing structures (11):

   If existing buildings are being considered for reuse as POMCUS facilities it is necessary to analyze the renovation costs against "new construction" costs. Major costs have been required to make existing buildings responsive to POMCUS activities; especially,

   1) adequate insulation for temperature controlled buildings,

   2) structural adequacy for lift capacities in maintenance facilities.

REQUIREMENTS

a) 9.1 A Non-Mechanical/Commel/Engineering Maint./Preservation Building will be PROVIDED and will contain a parts and tool storage room, small parts care and preservation room, and a spray painting booth. (2)

b) 9.3 A testing room for COMMEL equipment will be PROVIDED and contain shielding from radio frequency of low output. This is to allow proper adjustment of equipment without exterior interference. (2)

c) 9.6 A derust dip tank, sand blasting area, lubrication dip tank, marine equipment testing tank, and a monorail conveyor to transport small parts through the various testing and preservation facilities shall be PROVIDED. (2)

d) 9.7 A loading dock and shelving in the parts and tool storage rooms and small parts care and preservation rooms shall all be PROVIDED. (2)

e) 9.8 Centralized compressed air system shall be PROVIDED to run the paint sprayers, perform cleaning functions, and for pneumatic tool operations. (2)

CRITERIA

d) 9.7 Loading dock shall be 13.7m X 3.0m with levelers. (2)

GUIDANCE

REQUIREMENTS

f) 9.10 Appropriately designed acoustical shielding shall be installed. (2)

g) 9.9 Wet pipe sprinkler system shall be PROVIDED for fire protection due to the use of paints, cleaning fluids, and other volatile liquids. (2)

h) 9.10 The engineering maintenance area shall be PROVIDED with an engine exhaust system to allow test running of generators and the like, within the building. (2)

i) 9.11 Ventilation system shall be capable of preventing the buildup of noxious fumes within the shop areas to reduce threat of explosion or poisoning. (2)

j) 9.12 Locker rooms containing toilets and showers for personnel shall be PROVIDED. (2)

k) 1.4 Offices and shops not having natural ventilation will have mechanical ventilation. (2)

l) 5.1.2 A water distribution system for domestic and industrial usage will be PROVIDED ensuring an adequate rate of flow to all maintenance facilities. (2)

CRITERIA

f) 9.5 Walls and ceilings of each test room will be acoustically treated to depress engine noise levels to 85 dB. (2)

i) 9.11 System shall provide 20 air changes per hour within these areas assuming an artificial ceiling height of 3 meters. (2)

k) 1.4 System shall provide ten air changes per hour, unless otherwise noted. (2)

GUIDANCE

REQUIREMENTS

m) 3.5 The lighting system shall provide minimum illumination intensities as follows: (2)

n) 9.4 The facility will be PROVIDED with a secured, paved, exterior holding area. (2)

CRITERIA

m) 3.5.2 250 lux inside of all maintenance, guard and administration facilities. (2)

n) 9.4 Area shall be 250 sq meters for engineer equipment awaiting service. (2)

GUIDANCE

PURPOSE

ISSUES and ASSUMPTIONS

1.2
For those materials and supplies which may deteriorate or be damaged if stocked in the open, roofed open storage or controlled humidity storage will be PROVIDED. (2)

3.10.2.1 In high humidity environment, conventional storage facilities do not afford adequate protection to certain types of supplies preserved Level C against damage and deterioration that can result from excessive humidity. This is particularly applicable where supplies are to remain in storage for extended periods. To insure that the capability of material to perform its intended function will not be impaired or that supplies will not become unfit for consumption as a result of exposure to excessive humidity, methods have been developed to provide control of humidity within storage warehouses. (7)

3.10.7.10.2 Where battery-powered equipment cannot be or is impracticable to obtain or use in controlled humidity storage, gasoline-engine-powered equipment can be used with certain precautions. In use of such equipment, certain factors must be considered. (7)

3.10.7.10.2.2 When utilizing engine-driven materials handling equipment in controlled humidity warehouses, any concentration of carbon monoxide gas which exceeds 100 parts of carbon monoxide per 1,000,000 parts of air must be prevented. (7)

3.10.3.3 The modern, permanent warehouses (WW II and later) are preferred for the storage of current distribution stocks. These warehouses will be converted to controlled humidity space (by section or complete warehouse) as required and permitted by available funds. (7)

3.10.3.5 Sections of warehouses used exclusively for shipping, receiving, and box shop operations normally will not be converted to controlled humidity space. (7)

3.10.3.6 Considering cost of installation and continuing cost of operation, controlled humidity space can be installed most economically in permanent and standard portable frame warehouses, such as: (7)

3.10.3.6.1 Permanent-type standard warehouses constructed since 1950, 200'X 1000', built-up roof, concrete roof decking with steel framing or laminated wood roof framing, block or brick side walls and dock level floors. (7)

3.10.3.6.2 Permanent-type warehouses, gabled roof with steel framing; block or tile walls, windows, and louvers. (7)

3.10.3.6.3 Permanent type warehouses constructed between 1940 and 1950, 180'x1440' (or multiples of 240' sections), with monitor in center third of roof, block or brick side walls, and dock level floor. (7)

ISSUES and ASSUMPTIONS

1. Examination and evaluation of existing structures (11):

   If existing buildings are being considered for reuse as POMCUS facilities it is necessary to analyze the renovation costs against "new construction" costs. Major costs have been required to make existing buildings responsive to POMCUS activities; especially,

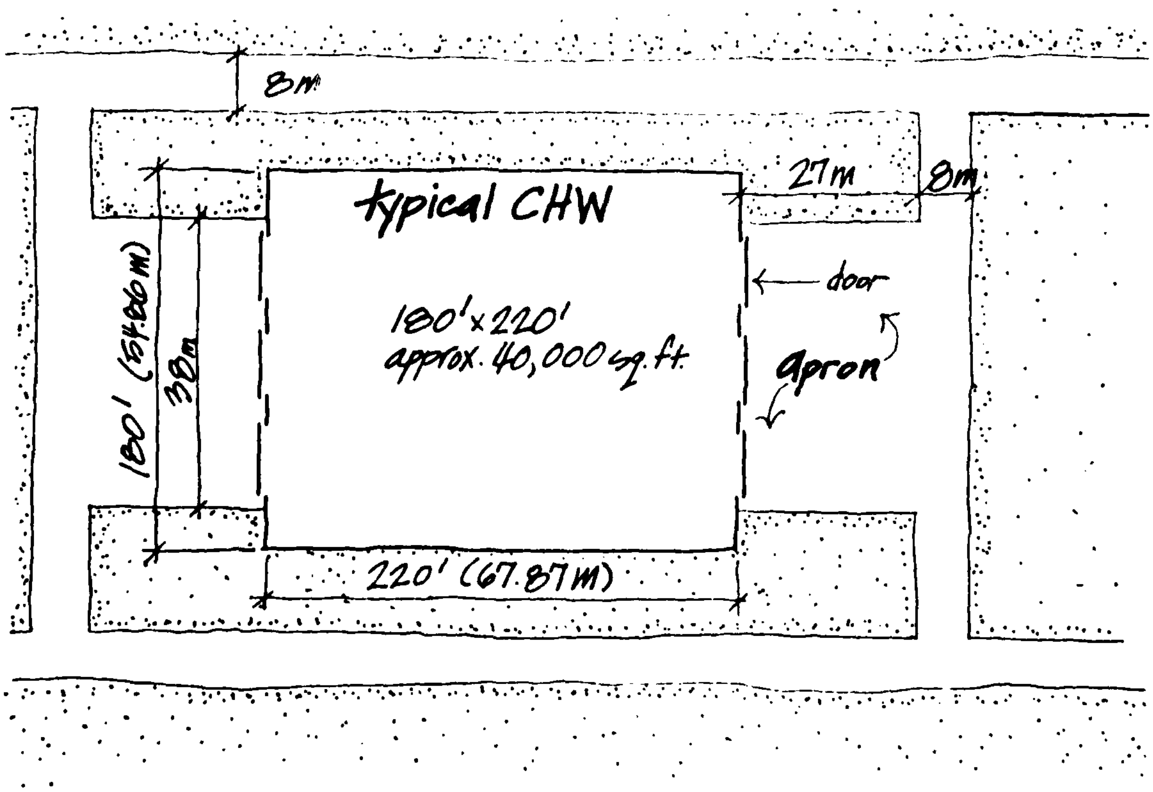
   1) control of humid air infiltration into CHW at existing openings,

   2) adequate insulation for temperature controlled buildings.

   Roads per CHW: 500m x 8m = 4000m^2

   Turnpad per CHW: 1 @ 10m x 20m = 200m^2

   Aprons (2 per CHW): 1=38mx27m=1026m^2 each or 2052m^2 per CHW



REQUIREMENTS

a. 4.2.1 CHS warehouses will be of semi-permanent type construction providing the controlled humidity storage requirement can be met. (2)

b. 4.2.1 An annex to each warehouse will be PROVIDED to house dehumidifying equipment. Necessary dehumidifier units will be PROVIDED. (2)

c. 3.10.3.1 Controlled humidity storage space should be provided for areas where the outdoor relative humidity is 40 percent or above for more than 50 percent of the total time. (3)

d. 3.10.7.1 Controlled humidity equipment should be located within the warehouse so as not to obstruct traffic aisles. (3)

e. 3.10.7.2 It is essential that the entrance of humid air into controlled humidity warehouses be kept to the minimum in order to maintain the relative humidity at desired level. Door control is of paramount importance, since the greatest source of moisture penetration is through open doors.

CRITERIA

a. 3.10.3.2 Equipment for the control of humidity in storage space will be operated so as to maintain 40 percent relative humidity (RH). (3)

GUIDANCE

1.2

For all CHS warehouses and other buildings, austere construction will be employed as far as possible. Austere construction means light prefabricated metal, cement, or cinder block or other low cost nonflammable construction, which will insure sufficient protection against climatic conditions of the site. (2)

NOTES

DI 16

NM-1
LOADING DOCK AND HOLDING AREA

function/purpose

To receive non-mechanical equipment and perform initial maintenance before storing. The same area is also used for REFORGER and mobilization staging prior to Unit Issue.

issues and assumptions

1. Combining non-mechanical, COMMEL and engineering equipment facilities. Users recommended not combining these three equipment types in a single integrated building. Specific concerns that should be investigated are:

   a. Security problems for COMMEL equipment.

   b. Confusion and traffic "bottlenecks" during REFORGER and mobilization issues.

   c. Difficulty in maintaining facility responsibility and space assignments.

2. Installations that do not have the S/R facility (PI-24) should have a minor shipping/receiving functional area or indicated in 1a and 1b under requirements and criteria.

activities	personnel	equipment
1. Uncrate. 2. Inventory/serviceability. 3. Repack and seal/preserve.	2 - LNs.	1. 2 forklifts. 2. 2 hand cutters. 3. 2 pry bars. 4. 1 display board on wall 20 ft. long x 4 ft. high. 5. Preservation paper. 6. Preservation tape. 7. Nails and hammers. 8. Worktable (20 ft. long x 3 ft. wide).
1. Move equipment to dock. 2. Receipt and transfer.	4 personnel (LNs), plus military unit personnel assigned.	(Same as above)

requirements

1. Adequate area.
2. Access doors.
3. Illumination.
4. Power.
5. Environmental.

criteria

1a. Loading dock - 12 ft. deep x the total length of the overhead doors (3 ft., 10 in. high).

1b. Holding area - approximately 1200 sq. ft.

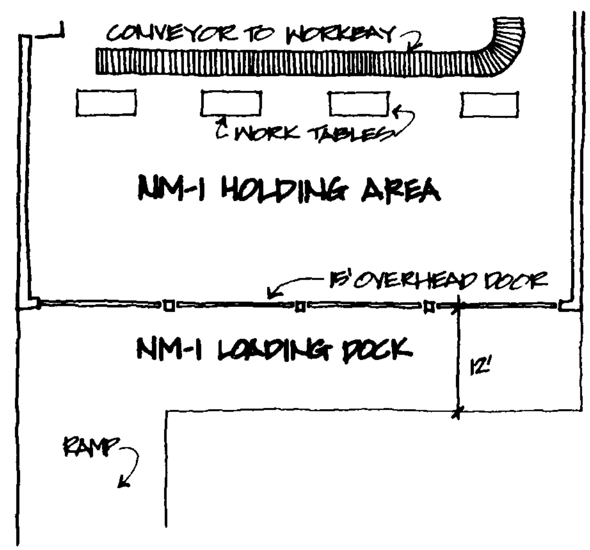
2. 4 overhead doors (15 ft. x 15 ft.) (one opening to have drive-in ramp rather than dock).

3. -

4. 110V service.

5. 20°C during winter.

guidance



DI 16

NM-2
WORK BAY FOR NON-MECH. EQUIPMENT

function/purpose
To maintain serviceability of all stored non-mechanical equipment.

issues and assumptions

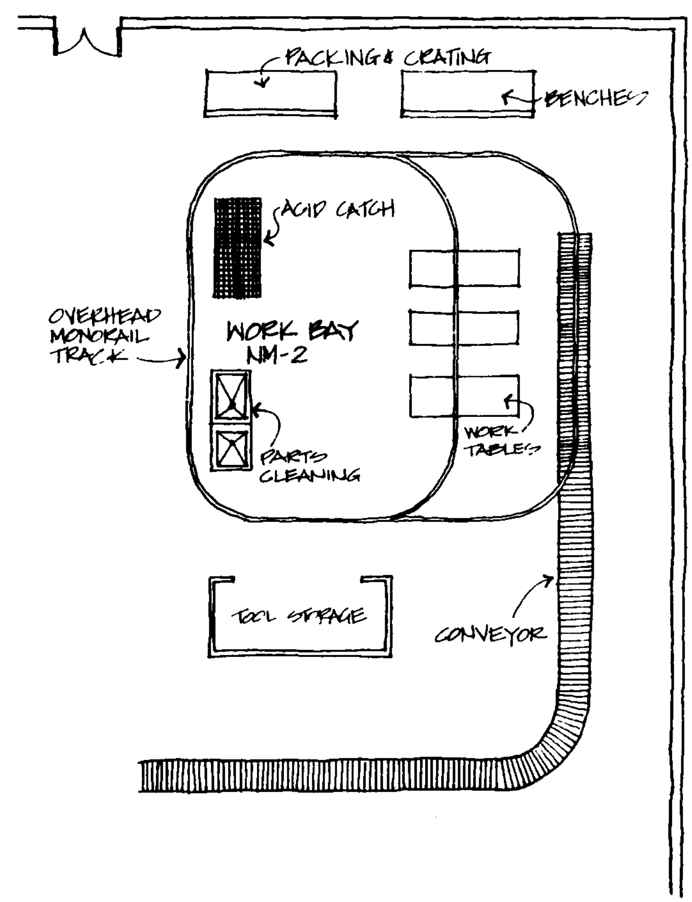
activities
1. Repair equipment.
2. Install equipment modifications.

personnel
4 - LNs.

equipment
1. 2 work benches with tool racks (7 ft. long x 3 ft. deep).
2. 3 worktables (8 ft. x 3 ft.).
3. Parts cleaning station (see "Guidance").
4. Conveyor to storage area.
5. Miscellaneous tools (see tool storage area "requirements").
6. 5 equipment dollies (48 in. x 36 in.) at work benches and tables.

requirements	criteria
1. Adequate area.	1. 1200 sq. ft.
2. Worktables or counters.	2. 20 ft. long x 3 ft. deep.
3. Display board on walls.	3. 20 ft. long x 4 ft. high.
4. Communications.	4. Intercom from work bay to office.
5. Illumination.	5. 400 lux - fluorescent
6. Environmental control.	6. $20^{o}C$ during winter.
7. Materials handling.	7. Monorail (see "Guidance").
8. Parts cleaning area.	8. See OM-7.

guidance



DI 16

NM-3
NON-MECH. EQUIPMENT STORAGE AREA

function/purpose

To locate a storage place, store, and inventory non-mechanical equipment.

issues and assumptions

1. For the extensive amount of non-mech materials loaded during REFORGER exercises it is considered better to store these items in the CHW's for efficient loading operations rather than in this maintenance building. Therefore the space NM-3 is not included on the Facility Layout Concept at the end of this section.

activities

1. Location identification.
2. Store items.

personnel

3 persons (LN).

equipment

1. Planograph.
2. 1 forklift.
3. Sledgehammer.
4. Pallets.
5. Pallet risers.
6. Shelving.
7. Racks for crates.
8. Conveyor from "holding area" and to "work bay."

requirements	criteria	guidance
1. Adequate area.	1. 32,000 sq. ft. (area based on specific non-mechanical equipment assigned to the site).	
2. Materials handling.	2. Conveyor from storage area to work bay. Conveyor from storage area to loading dock.	
3. Security.	3. Area must be lockable when unmanned.	
4. Humidification.	4. 40 percent relative humidity.	
5. Communications.	5. Intercom from storage area to office.	
6. Environmental control.	6. $20^{0}C$ during winter.	
7. Illumination.	7. General lighting 300 lux.	
8. Power.	8. 110V adjustable cable.	

DI 16

NM-4

EQUIPMENT TURN-IN AREA/REFORGER

function/purpose

To clean up and re-inventory non-mechanical equipment prior to turn-in after REFORGER exercises.

issues and assumptions

1. Military unit personnel clean-up of equipment:

   The extensive amount of equipment clean-up prior to storing after a REFORGER exercise requires using military unit personnel to augment the CEGE company personnel. Furthermore, these activities are more effectively performed if they are not a part of the regular non-mechanical equipment maintenance areas. The majority of the work can be accomplished in a covered, lighted exterior space.

activities	personnel	equipment
1. Clean-up of equipment. 2. Apply preservation wrappings.	2 persons; military unit personnel.	1. Table (20 ft. x 3 ft.). 2. Preservation tape. 3. Preservation paper. 4. 4 equipment dollies (48 in. x 36 in.) at work table.

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TYPE II FORWARD STORAGE SITE FACILITIES: POMCUS SYSTEM. VOLUME --ETC(U)
SEP 80 R L PORTER
UNCLASSIFIED CERL-TR-P-112-VOL-2 NL

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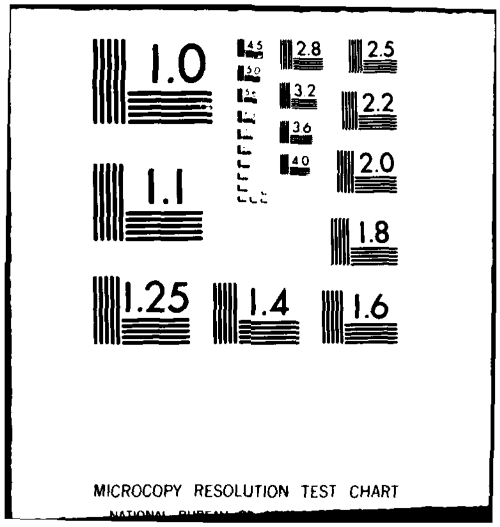
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MICROCOPY RESOLUTION TEST CHART

requirements	criteria	guidance
1. Adequate area.	1. 10,000 sq. ft.	1. Area must be in different location than the non-mechanical equipment warehouse.
2. Sinks.	2. Cold water.	
3. Weather protection.	3. Area must have canopy. Area does not need to have walls.	
4. Illumination.	4. 150 lux under canopy.	

DI 16

NM-5
ADMINISTRATIVE OFFICE AREA

function/purpose

To administer maintenance activities and non-mechanical equipment inventory records.

issues and assumptions

activities

1. Personnel assignment.
2. Maintain inventory records.
3. Determine storage locations.

personnel

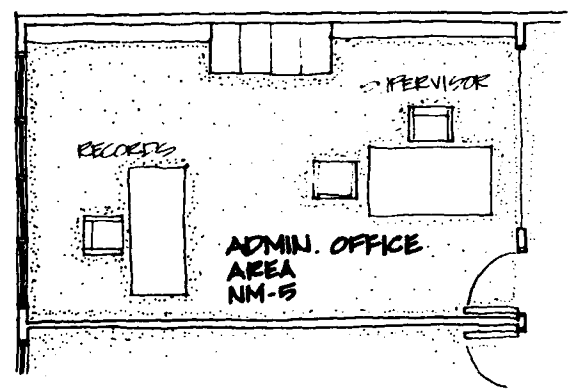
2 - 1 military, 1 LN.

equipment

1. 2 desks (30 in. x 60 in.) with chairs.
2. Bookcase - 48 in. x 18 in.
3. File - 15 in. x 28 in.

requirements	criteria
1. Adequate area.	1. 80 to 90 sq. ft. per workstation, plus equipment area.
2. Environmental control.	2. 20°C.
3. Security.	3. Room must be lockable when unmanned.
4. Communications.	4. Phone; also, intercom from office to all warehouse areas.
5. Power.	5. 110V service.
6. Illumination.	6. 500 lux with fluorescent fixtures.

guidance



DI 16

NM-6
BREAK AREA/LOCKER/LATRINE

function/purpose

Latrines, Showers, and Locker Rooms for Facility Personnel Use.

Personnel Training and Work Break Activities. A break, training, and conference area should be provided at a central location in the building where persons can assemble for daily work breaks and periodic group training sessions.

issues and assumptions

Toilet facilities shall be provided for men and women:

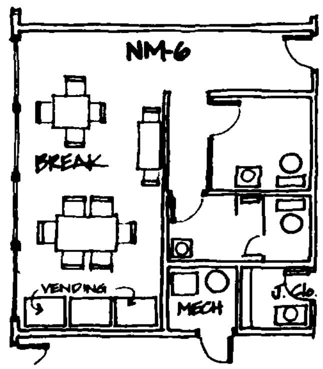
1. Water consumption: In some locations, reducing water consumption is important. On military facilities, the installation of water-saving devices in latrines would reduce the amount of water that is used without affecting the operation of the equipment. This is especially important in geographic areas where water supplies are dwindling; in addition, it reduces water supply costs at all military installations.

2. Flexibility of Break, Training Facilities:

Adequate space (area) for breaks, training, and/or conferences is required. Most facilities have fixed-wall construction on interior walls. Movable walls would allow flexibility in space allocation.

activities	personnel	equipment
1. Washing. 2. Eliminating. 3. Self-grooming. 4. Personal storage.	All the personnel assigned to the facility; visitors.	1. Wash basins/soap holders. 2. Showers. 3. Urinals/water closets. 4. Mirrors. 5. Paper towel holders. 6. Lockers, benches. 7. Wastebaskets.
1. Training classes. 2. Breaks. 3. Conferences.	Could include all personnel working in the building, probably in groups of 20 percent of assigned maximum.	1. Tables with side chairs. 2. Vending machines. 3. Drinking fountain.

requirements	criteria	guidance
1. Illumination. 2. Power. 3. Plumbing fixtures. 4. Temperature. 5. Adequate ventilation. 6. Adequate size.	1. 250 lux. 2. 110V at least 24 in. above finished floor; (one 20A duplex/wall). 3. Provide water closets, urinals, and wash basins. Install water-saving devices in water closets, faucets, and showers. 4. 20°C during winter. 5. 4 air changes per hour. 6. Space allocation. A minimum size should be determined and specified based on number.	1. Use fluorescent fixtures for lighting. 2. Latrines should be centrally located and accessible from exterior and interior work areas. 3. Latrines should be provided in each inhabited building within a complex. 4. Latrines should be located in the parts of the building constructed as shop or office space. There are a number of different types of water-saving devices produced by commercial manufacturers that can be installed in water closets, faucets, and showers. 5. See OM-16 sheets for typical plan layouts.
1. Adequate size. 2. Smoking area ventilation (must be physically separated from vehicle bays). 3. Power. 4. Water sources for drinking fountain and coffee machines. 5. Illumination. 6. Communication. 7. AV screen.	1. A minimum size should be determined and specified based on number. 2. Ventilation - 10 air changes per hour. 3. Provide one 120V-20A duplex receptacle for each vending machine. Minimum of one on each wall. 4. -- 5. 500-lux, fluorescent ceiling fixtures, with one fixture at rear of space switched separately for minimum light level for AV presentations. 6. One wall telephone. 7. 8-ft. x 8-ft. *pulldown* screen.	1. *Example:* A room 24 ft. x 24 ft. (or 575 sq. ft.) will provide adequate space for tables and chairs, plus some standing room or space for vending machines and adequate distance for AV presentations. 2. The use of second-floor space for office area, conference rooms, etc. would release area on the ground floor for other activities.



DI 16

NM-7
MAINTENANCE SUPPLY STORAGE

function/purpose

Storage of floor dry, clean and dirty shop towels, etc. (janitor's closet).

issues and assumptions

activities

1. Receiving.
2. Inspection.
3. Placement.
4. Storage/inventory.
5. Dispensing.

personnel

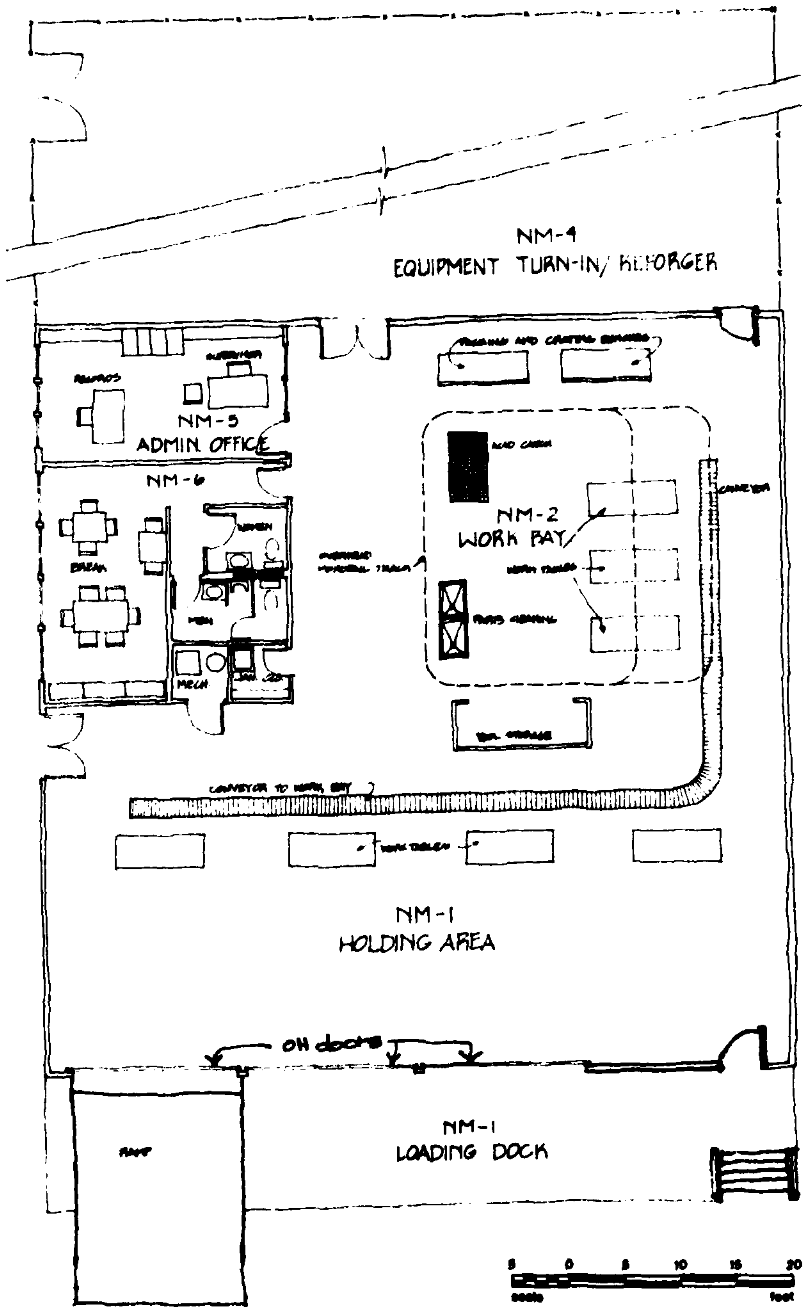
None.

equipment

1. Shelves (20 lin. ft.)
2. Containers with lids (clean 55-gal. drums).
3. Service sink.
4. Hooks.

requirements	criteria	guidance
1. Adequate size. 2. Illumination. 3. Service sink. 4. Environmental control.	1. 70 to 100 sq. ft. minimum space to accommodate requirements based on size and number of items to be stored. 2. 100 lux (use incandescent fixtures). 3. Hot and cold water. 4. $20^{0}C$ during winter.	Location: Should be central to common-use areas of the facility and have access to general circulation. Clean towels can be dispensed through the work bay. The floor drying compound and the dirty towel containers (drum) can be located inside the work bay. Brooms, mops, cleaning supplies, etc., should be secured in the "janitor's closet."

NOTES



For the extensive amount of non-mech materials loaded during REFORGER exercises it is considered better to store these items in the CHW's for efficient loading operations rather than in this maintenance building. Therefore the space NM-3 is not included on the Facility Layout Concept

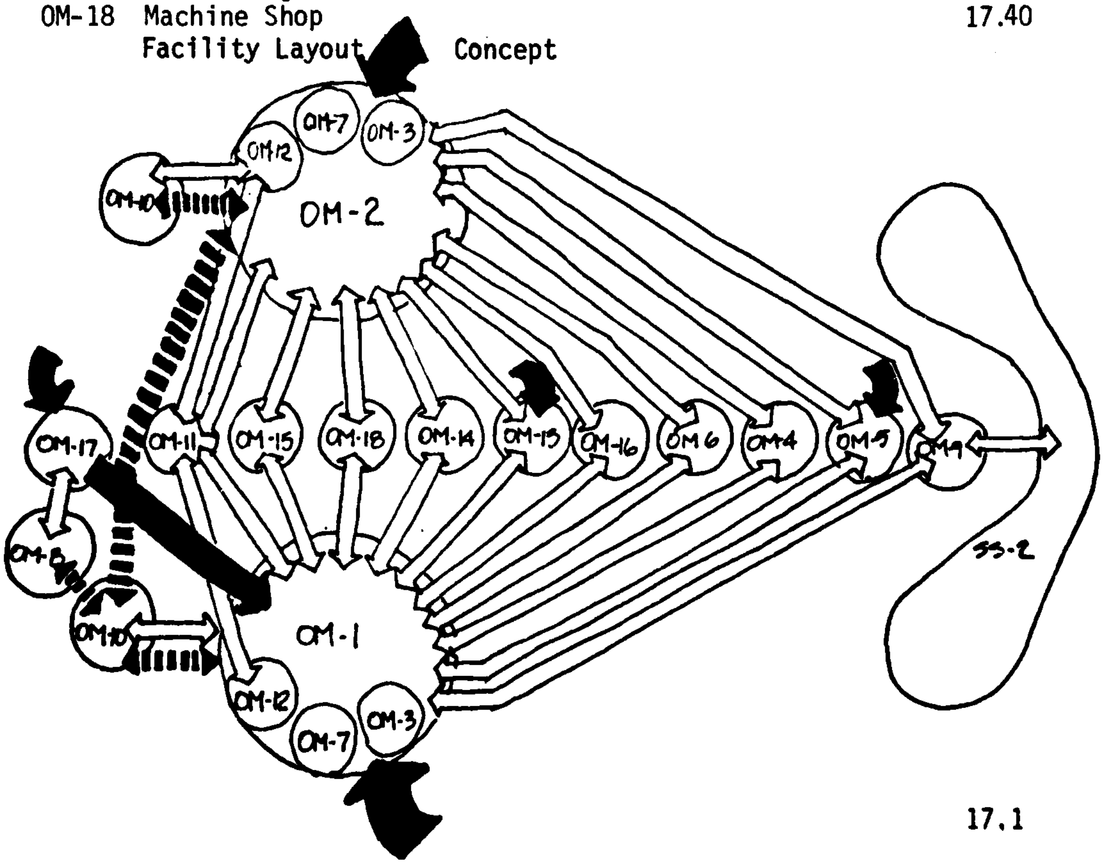
Organizational Maintenance

Literature Information

Organizational and Direct Support Maintenance Facility 17.2

User Information

OM-1	Tracked Vehicle Maintenance Bays	17.6
OM-2	Wheeled Vehicle Maintenance Bays	17.8
OM-3	Service Pits	17.10
OM-4	Tire Shop	17.12
OM-5	Welding Shop	17.14
OM-6	Battery Shop	17.16
OM-7	Parts Cleaning Workstation	17.18
OM-8	Retrofit Exterior Vehicle Service Bay	17.20
OM-9	Track and Gun Sight Service Area	17.22
OM-10	Administrative Office Area	17.24
OM-11	Maintenance Supply Area	17.26
OM-12	Tool and Test Equipment Storage	17.28
OM-13	DX and Shop Stock Storage	17.30
OM-14	Break and Group Training Area	17.32
OM-15	Individual Learning Area	17.34
OM-16	Latrines/Locker/Shower Rooms	17.36
OM-17	POL Storage	17.38
OM-18	Machine Shop	17.40
	Facility Layout Concept	



PURPOSE

7.1 A facility to perform Organizational and Direct Support Maintenance on vehicles and equipment stored at the site and used in operations will be PROVIDED. (2)

ISSUES and ASSUMPTIONS

7.2

a) Number and sizes of maintenance facilities depend on the numbers and types of vehicles and equipment served and will be specifically justified in each case. (2)

b) 5.2 If the primary water supply required to satisfy the above demand is inadequate, or is not available, ground level storage points or open tanks will be PROVIDED. (2)

1. Examination and evaluation of existing structures (11):

If existing buildings are being considered for reuse as POMCUS facilities it is necessary to analyze the renovation costs against "new construction" costs. Major costs have been required to make existing buildings responsive to POMCUS activities; especially,

1) adequate insulation for temperature controlled buildings,

2) structural adequacy for lift capacities in maintenance facilities.

REQUIREMENTS

a) 7.2 The facility shall be provided with battery preparation areas with emergency shower and eyewash fountain, tire repair areas, centralized compressed air system, parts storage,lubrication racks, office space, latrines, welding shop, production control offices, locker rooms, shower rooms, and break area. (2)

b) 7.2 The Facility shall be provided with overhead cranes and vehicle lifts. (2)

c) 7.3 Emergency showers and eyewash are required in the battery room due to the nature of materials being handled and the occasion for severe accidents. (2)

d) 7.4 Locker rooms and showers shall be PROVIDED. (2)

e) 7.5 Building shall be PROVIDED with mechanical ventilation in the battery shop and a special automatic exhaust for vehicle emission in the working area. (2)

f) 7.6 A suitable break area will be PROVIDED. (2)

CRITERIA

b) 7.2 The facility shall be PROVIDED with a 14 metric-ton traveling overhead crane, 18.5 metric-ton vehicle lifts. (2)

GUIDANCE

REQUIREMENTS

g) 7.7 An area shall be PROVIDED to accomplish the additional requirements of DS level maintenance on tracked and wheeled vehicles and equipment stored at the site and used in operations. (2)

h) 7.7 The DS Level maintenance area shall be PROVIDED with a traveling overhead crane for the purpose of pulling turrets and heavy components of equipment, as well as power packs. (2)

i) 5.1.2 DOMESTIC USAGE A water distribution system for domestic and industrial usage will be PROVIDED ensuring an adequate rate of flow to all guard and administrative buildings, and to all maintenance facilities. (2)

j) 1.2 Oil separators will be PROVIDED on floor drains from all vehicle areas. (2)

k) 1.4 Offices and shops not having natural ventilation will have mechanical ventilation. (2)

l) 3.5 The lighting system shall provide minimum illumination intensities as follows: (2)

CRITERIA

h) 7.7 The overhead crane shall have an 18.5 metric-ton cap. (2)

j) 1.2 Oil separators will have a net capacity of 2.50 liters for each square meter of surface to be drained. (2)

k) 1.4 Mechanical ventilation will provide 10 air changes per hour, unless otherwise noted. (2)

l) 3.5.2 250 lux inside of all maintenance, guard and administration facilities. (2)

GUIDANCE

REQUIREMENTS

m) 3.4 All maintenance, storage, guard buildings and entrances to the site perimeter fence will be PROVIDED with lighting controlled by local switching. (2)

n) 3.5.5 Area lighting will be PROVIDED on all buildings. (2)

o) 7.5.1 Illuminated access aprons, one per door of magazines and bunkers, (Class V utilizes interlocking concrete block), as well as illuminated concrete aprons (tracked vehicles) around the Maintenance Facility, Trades Building, Wash Racks, Grease Racks, and Non-Mechanical Maintenance Facility shall be of sufficient size to permit turning and backing for larger vehicles. (2)

CRITERIA

o) 7.5.2 All aprons will be constructed of rigid pavement, except around Class V magazines and bunkers as noted above. (2)

GUIDANCE

DI 17

OM-1
TRACKED VEHICLE MAINTENANCE BAYS

function/purpose

Meet the Scheduled Service Requirements of Tracked-Based TOE Organizational Units. Common SOP requires all tracked vehicles to be cleaned and serviced at regular intervals and some tracked vehicles to be cleaned and serviced after field operations.

issues and assumptions

1. Scheduled maintenance on tactical equipment can be performed more efficiently and provide for positive pollution control if the proper inclosed facilities and equipment are provided.
2. It is desirable to be able to remove crankcase and transmission oils in tracked equipment with either the power pack in or removed from the vehicle.
3. If an "Oil Analysis Program" were universally established for vehicle crankcase oil, facility impacts would be:
    a. Fewer scheduled maintenance bays would be required.
    b. There would be less depot-level overhaul of power packs.
4. Number of bays required:

Assumptions	Factor
1) Track vehicle avg. 1/week w/50 week year. 2) 64% of CHW stored equipment is rotated for maintenance annually.	.02

Track (total # in CHW) x .64 x .02 = number of maintenance bays required.

activities

1. Oil and oil filter changing for wheeled and tracked equipment.
2. Fluid level checks.
3. Radiator flushing for water-cooled engines.
4. Power pack removal.
5. Power pack cleaning.
6. Hull cleaning.
7. Gun tube replacement.
8. Gun tube cleaning.
9. Tire changing.
10. Greasing and lubrication for wheeled and tracked equipment.
11. Ground-hopping of tracked equipment.
12. Power pack replacement.
13. Large component parts cleaning (heatshields, fuel cells, etc.)

personnel

1 to 3 per bay; a function of vehicles' scheduled maintenance requirements

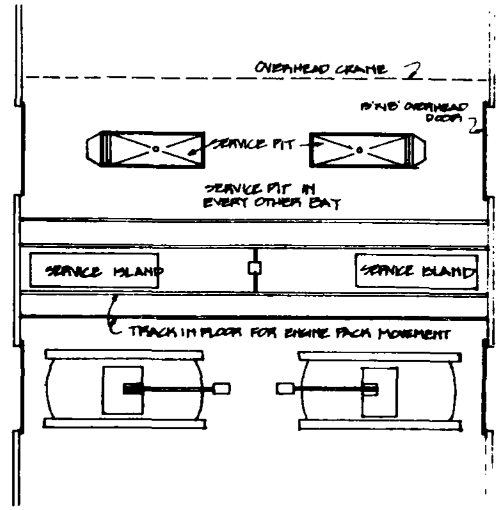
equipment

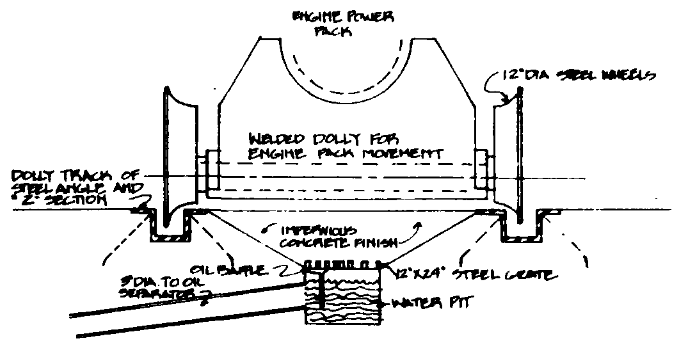
1. Movable sliding waste oil collection funnels side-discharging to waste oil collection trough.
2. Steam/hot water cleaners
3. Fluid-dispensing system with retractable hoses.
4. Floor jacks, either portable or fixed in floor.
5. Power pack dollies.
6. Solid waste storage cans.
7. Recirculating-solvent small parts washer. (See OM7.)

	requirements	criteria
1.	Adequate space to meet the service requirements of many tracked or large wheeled vehicles simultaneously. Service pit at least 2 bays; see OM3.	24 ft. x 40 ft. as basic bay dimensions; see "guidance sketches" for "between" bay areas.
2.	Vehicle and personnel access.	Bays to have drive-through capability, 15 ft. wide x 20 ft. high vehicle doors to be motorized. Personnel doors to be 3 ft. x 7 ft.
3.	Electrical power.	110V, 220V, 24V DC.
4.	Retractable dispensing lines for servicing vehicles.	Transmission oil, gear oil, water, compressed air, two grades of lubricating oil, and hydraulic fluid.
5.	Wastewater pretreatment with discharge to sanitary sewer.	-
6.	Waste receptor systems.	Solid waste receptacles, waste solvent collection sewer, and waste oil collection to outside underground waste oil storage.
7.	Light on all vehicle exterior surfaces.	General lighting 300 lux with retractable trouble lights.
8.	Two-position vehicle exhaust system at each bay.	-
9.	Working temperature.	20°C during winter.
10.	Lift capability.	18.5 metric ton capacity traveling bridge crane.

guidance

MAINTENANCE BAYS: Typical 4-bay grouping; number of bays is based on the number of tracked vehicles stored.





SECTION THRU DOLLY WASH PIT FOR BAY

DI 17

OM-2
WHEELED VEHICLE MAINTENANCE BAYS

function/purpose

Perform wheeled vehicle maintenance repair.

issues and assumptions

1. Overhead hoist for materials lifting where there is no bridge crane:

   Currently, there is no provision for other than manual lifting capability in some bays. Personnel can be injured and equipment damaged if manual lifting is used to remove and replace moderately heavy parts.

   a. A small hoist will reduce injuries and equipment damage.

   b. Parts weighing more than 100 lb. should be lifted with a hoist.

2. Number of bays required:

assumptions	factors
1) wheel vehicle avg. 5/week with 50 week yr.	.01
2) trailer avg. 5/day with 250 work days year	.002
3) 64% of CHW stored is totaled for maintenance annually	[wheel (total in CHW) x.64 x .01]+[trailer (total in ext) x .89 x .002] = number of maintenance bays required
4) 89% of trailers stored outside is rotated for maintenance annually	

activities

1. Inspection.
2. Removal and replacement of parts.
3. Diagnostics.
4. Minor repairs.
5. Tire changing and repairs.
6. Radiator flushing for water-cooled engines.
7. Lubrication of all grease fittings.

personnel

Variable; a function of maintenance or repair operations.

equipment

1. Tool kit.
2. Jacks; portable or fixed.
3. Solid waste storage cans.
4. See "Tire Shop" sheets, OM 4.
5. Fluid-dispensing system with retractable hoses.
6. Recirculating-solvent small parts washer. (See OM 7.)

requirements

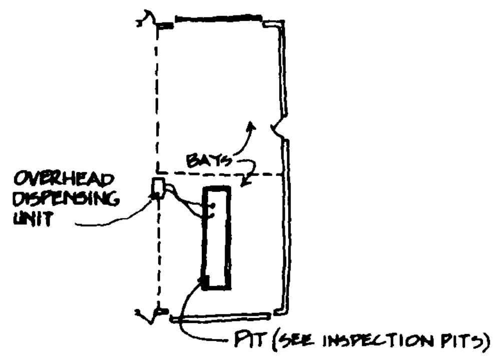
1. One double drive-through bay area with an inspection pit in one end. (See OM 3.)
2. OH door to outside.
3. Power.
4. Utilities for the fluid-dispensing unit.
5. Sanitary sewer drain in both bays.
6. Vehicle exhaust system.
7. Working temperature.
8. Lighting.
9. Non-skid floor surface.
10. For layouts of several adjacent bays, a traveling bridge crane servicing all maintenance bays should be installed.
11. Provide light crane in at least one bay per facility to help lift parts being removed or replaced.

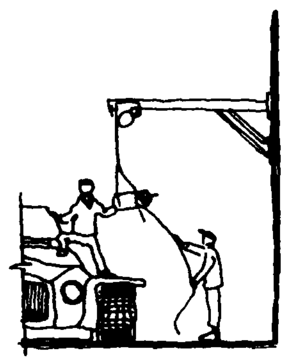
criteria

1. 24 ft. x 40 ft. (see guidance sketch). Number of bays is based on number of wheeled vehicles stored.
2. Powered OH door (15 ft. x 18 ft. high).
3. 110V, 220V, and 24V, DC.
4. Transmission oil, gear oil, water, compressed air, engine oil (two grades), and hydraulic fluid.
5. -
6. -
7. 20°C during winter.
8. General lighting 300 lux with retractable trouble lights.
9. Concrete slab.
10. 14 metric tons, or as determined for specific project.
11. 2 metric tons capacity (exact size to be determined for specific project).

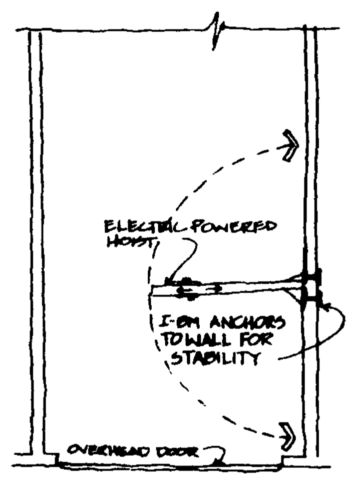
guidance

1. Bays should be near shop control, supply, and tool rooms.
2. Convenient access to offices, PLL, and tools, or to common-use bays.
3. Hoist lifts in at least two bays should be considered for small wheeled vehicles such as jeeps.





BAY SECTION



BAY PLAN

DI 17

OM-3
SERVICE PITS

function/purpose

Performing Inspections, Maintenance, Lubrication, and Oil Changes of the Underside of Vehicle.

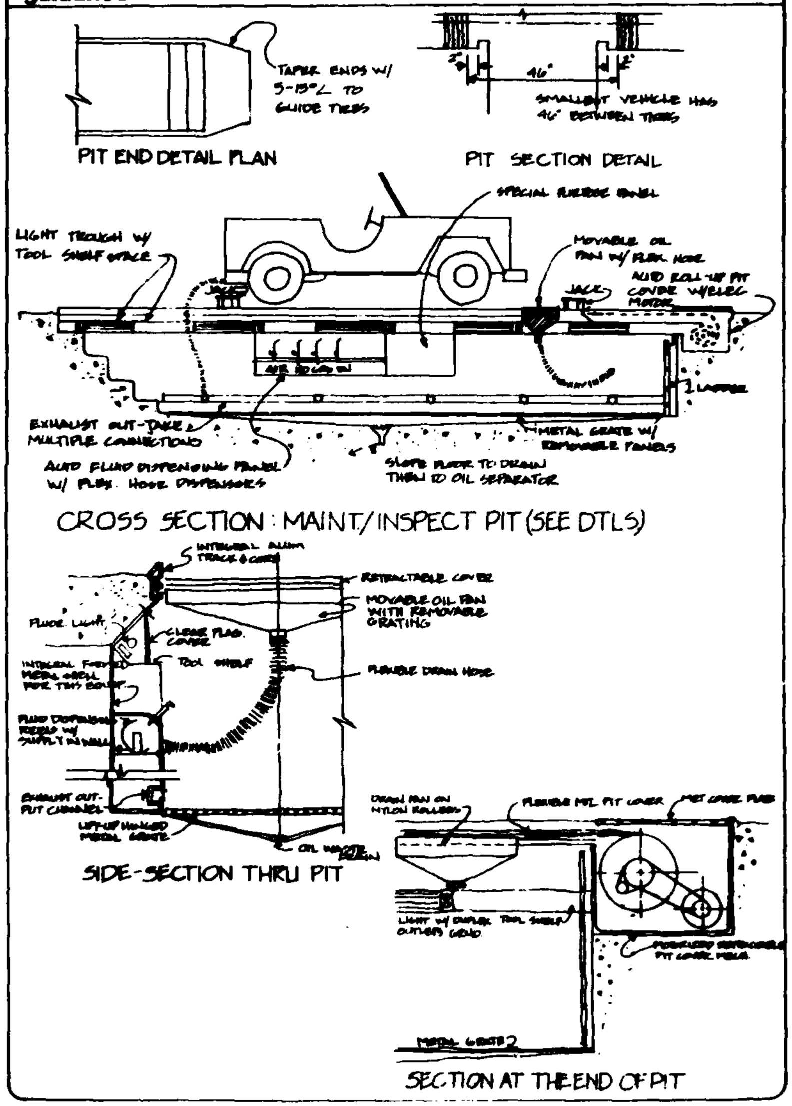
issues and assumptions

1. Inspection pit usage vs. grease racks:
   - a. Oil and grease racks are inadequate because they (1) *cannot* be used in inclement weather, (2) are not designed for the convenience of the users, and (3) result in significant oil and grease spillage.
   - b. Inspection pits for "dry activities" would be provided *in wheeled* bays.
   - c. "Oil and greasing" pit(s) would be provided in a central part of the bay. The number required is dependent on the capacity of a pit to support vehicle servicing at an adequate rate.
   - d. A "washing" pit that is semi-enclosed or completely enclosed would be provided as part of the vehicle washing facility.

activities	personnel	equipment
INSPECTION & MAINTENANCE PIT 1. Drive vehicle on and off pit. 2. Inspect. 3. Adjust. 4. Remove and replace parts. 5. Test vehicle.	1 mechanic.	(See guidance sketches.)
LUBRICATION & MAINTENANCE PIT 1. Drive vehicle on and off pit. 2. Drain and/or replace: engine oil transmission *fluid* gear/transmission fluid hydraulic fluid brake fluid. 3. Grease components. 4. Remove and replace parts. 5. Test vehicle.	1 mechanic.	(See guidance sketches.)

requirements	criteria
INSPECTION & MAINTENANCE PIT	
1. Adequate size.	1. One vehicle length long, track width of narrowest vehicle wide.
2. Access from bay floor.	2. Stairs to pit floor at one end.
3a. Power for tools.	3a. 110V.
4a. Sanitary sewer (mainly for cleaning or emergency use).	4a. To wastewater treatment (possibly requiring sump pump).
5a. Lighting of vehicle underside.	5a. Fluorescent diffuser directing light upward, 200 lux.
5b. Retractable trouble light.	5b. -
6. Exhaust ventilation.	6. 12 air changes per hour, grills near pit floor.
7. Place for temporary storage of tools and parts.	7. Provide recesses into pit wall.
8. Curb around pit perimeter to: (a) keep water out, and (b) guide vehicles over pit.	8. 4 in. min., 6 in. max.
9. Protective cover or guardrail to prevent people from falling in when pit is not in use (OSHA).	9. -
10a. Provide retractable dispensing lines for: compressed air, gear oil, grease.	10a. -
11. Non-slip floor.	11. -
12. Position-adjustable jacks (four locations) to lift wheels.	12. -
LUBRICATION & MAINTENANCE PIT	
(SAME AS UNSCHEDULED MAINT. PIT EXCEPT:)	
3b. Power for pumps.	3b. May require 220V.
4b. Waste must be run through oil separator before draining to wastewater system.	4b. Waste must be run through oil separator before draining to wastewater treatment.
13. Oil collection system.	13. Movable drain pan; direct line to collection tank and oil evacuation system.
14. Waterproof electrical fixtures and good drainage of all parts of pit.	14. -

guidance



DI 17

OM-4
TIRE SHOP

function/purpose

Wheeled-Vehicle Tire Change and Repair.

issues and assumptions

1. Tire changing location:

Tire changing for wheeled vehicles occurs in a small room adjacent to the wheeled-vehicle maintenance bays.

activities

1. Jack up vehicle.
2. Remove wheel.
3. Break tire from wheel.
4. Leak-test tire.
5. Repair or replace tire or tube.
6. Inflate tire.
7. Replace wheel on vehicle.
8. Store waste tires.

personnel

Mechanics

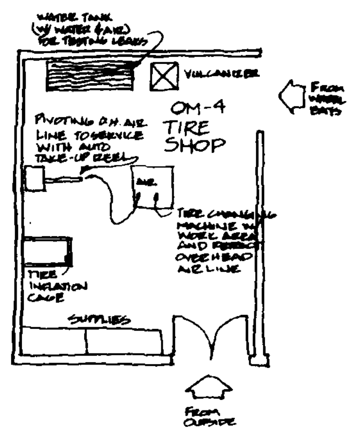
equipment

1. Hydraulic jack.
2. Impact wrench.
3. Soap solution or water bath; water tank.
4. Tire spreader/demounter combination for use on truck tires of up to 20-in.-diameter rim size. Unit to have built-in lamp for tire inspection.
5. Tire inflation gage.
6. Cabinet for storage of tire irons, vulcanizer for tube-type tires, accessories for tire machine, etc. (24 in. x 48 in. x 60 in. high).
7. Tire racks for temporary storage (10 lin. ft.).

requirements	criteria
1. Compressed air.	1. 120-175 psi.
2. Electrical service.	2. 110V.
3. Water supply and sanitary drain.	3. Cold water.
4. Illumination.	4. 300 lux at work surfaces.
5. Environmental control.	5. $20^{o}C$ during winter.
Adequate size	400 - 425 sf

guidance

1. Space convenient to exterior door (6 ft. wide or an overhead door).
2. Tire shop should be centrally located.
3. Shop must be on the ground floor of facility.



DI 17

OM-5
WELDING SHOP

function/purpose

Welding to Repair Minor Body, Structural, and Subassembly Failures. A welding shop usually requires screening adequate areas at the remote end of the common use bays or may require a separate room.

issues and assumptions

1. Welding types authorized:

   a. Gas, electric, and gas-electric welding may be used.

   b. For electric welding, a TO&E welding unit will be used and may be parked outdoors because of noise and engine exhaust.

activities

1. Prepare materials for welding (grinding, brushing, etc.).
2. Gas and arc welding of components either on vehicles or removed from vehicles.
3. Grind and finish welds, chip slag.

personnel

1 welder

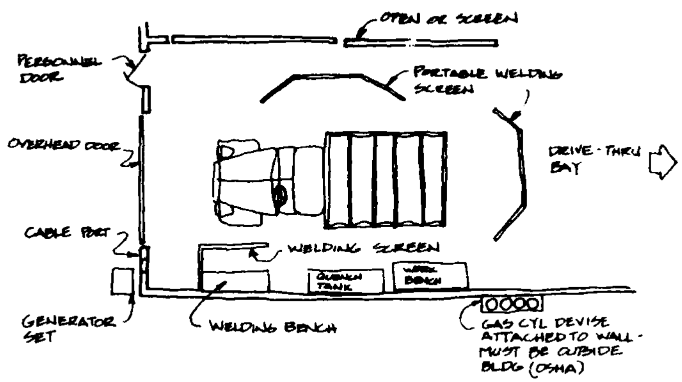
equipment

1. Gas-welding rig (oxygen tank, acetylene tank, hose, and torch).
2. Arc welder/generator unit.
3. Welding bench and booth.
4. Supplies for storage rack (rods, tools, flux).
5. 3 ft. x 6 ft. workbench with vise and storage cabinet (lockable underneath).

requirements	criteria
1. **Adequate space.**	1. One (or two) of the small maintenance bays.
2. **Flameproof partition on screen.**	2. 8 to 10 ft. high.
3. **Personnel door to outside.**	3. 3 ft. x 7 ft.
4. **Overhead door for vehicles.**	4. 15 ft. x 18 ft.
5. **Access port for welding cables if electric unit is outdoors.**	5. 12 in. x 12 in. (see Guidance).
6. **Portable light.**	6. 110V circuit.
7. **General ventilation or flexible local exhaust hood.**	7. If bay is confined and (a) less than 10,000 cu. ft., or (b) has less than a 16 ft. ceiling, or (c) natural cross ventilation is not provided, a general ventilation system is required with 10 air changes per hour. If local exhaust hood with 3 in. flange is provided, 100 fpm air flow must be provided in zone of welding.
8. **Power supply for welder.**	8. 110V high current (rough in 220V for future).
9. **Bottle-retaining device.**	9. See Guidance.
10. **Task lighting at benches.**	10. 500 lux (fluorescent fixture over bench).

guidance

1. Remote end of common-use bays.
2. Central for all types of vehicles and equipment.
3. Partitions must allow for air circulation at floor.



PLAN OF WELDING BAY

DI 17

OM-6
BATTERY SHOP

function/purpose

Testing, Recharging, Filling, and Cleaning of Vehicle Batteries.

issues and assumptions

activities

1. Remove battery from vehicle (done in parking area or outside building), and bring it into the shop.
2. Test batteries (clean battery terminals).
3. Fill batteries with new electrolyte.
4. Recharge batteries.

personnel

equipment

1. Battery carriers.
2. Battery-charging racks.
3. Battery chargers with cables.
4. Carboy racks for electrolyte. (See Guidance.)
5. Carboy tilter unit to fill batteries.
6. Counter/bench for filling process--corrosion-resistant stainless steel surface.

requirements

1. Adequate space. (In two separate rooms--battery shop and charging rooms).
2. Power.
3. Water.
4. Sanitary sewer in floor.
5. Adequate lighting.
6. Thermal comfort.
7. Exhaust ventilation. Separate system to outside.
8. Sink with acid-resistant surface and faucet.
9. Emergency shower (see Guidance).
10. Emergency eyewash fountain.
11. Fire extinguishers (OSHA).
12. Material-handling equipment (OSHA).

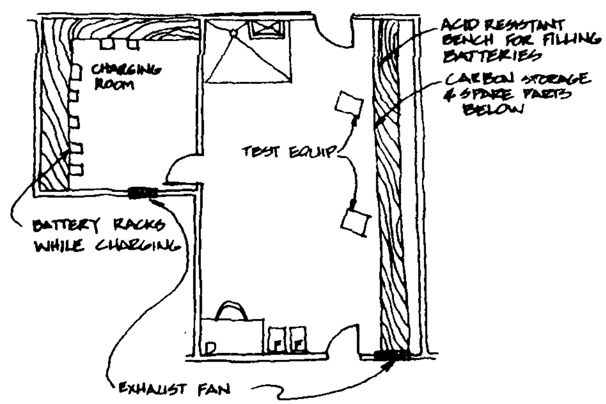
criteria

1. Battery shop--300-350 sq. ft. Battery charging--60-70 sq. ft.
2. 110V to power charger(s). Spark-resistant devices for all electrical items (OSHA).
3. Cold water line.
4. Fabricated with acid-resistant piping materials.
5. 400-lux fluorescent or incandescent lamps in corrosion-proof fixtures.
6. 20°C during winter.
7. 10 air changes per hour. Interlock must be provided to de-energize charging circuits if ventilation fails or is shut down.
8. -
9. -
10. -
11. -
12. Carboy.

(All motors are to be explosion-proof. All fixtures and switches are to be class II).

guidance

1. Central location for entire personnel access.
2. Convenient access to parking area.
3. Direct access to outdoors.
4. "No Smoking" signs (OSHA).
5. Receptacles located above charging racks.
6. Racks and other metal equipment should be coated (or covered) to prevent spark generation and should be acid-resistant.



DI 17

OM-7
PARTS CLEANING WORKSTATION

function/purpose

Cleaning of Small and Moderately Sized Parts With Liquid Cleaning Agents or Solvents. The parts removed from vehicles must be cleaned well, whether they are to be repaired and reinstalled at the organization, or packaged and sent to direct support, general support, or depot-level facilities.

issues and assumptions

1. Parts cleaning work station location:

Vehicle maintenance units require common-use parts cleaning work stations so that they can be used individually and conveniently.

activities

1. Clean parts.
2. Further disassembling if necessary.
3. Clean parts exposed by disassembling.
3. Reassemble.

personnel

All mechanics.

equipment

1. 3-ft. x 6-ft. workbench.
2. Parts washer-degreaser.
   a. Approximate 30-gal. solvent capacity.
   b. Drain from wash tub to holding tank.
   c. Powered pump with flexible nozzle and/or spray nozzle.
   d. Task light.
   e. Easily cleaned surfaces.
   f. Small parts drain basket.
3. "Floor-dry" compound container.
4. Portable parts cleaner.

requirements

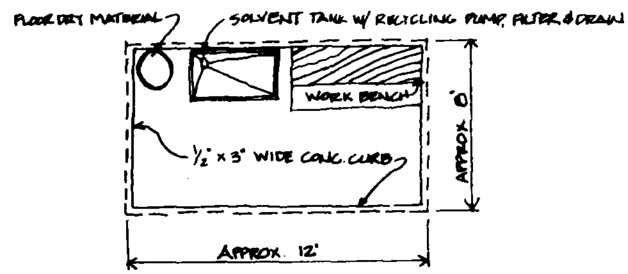
1. Adequate space.
2. Power.
3. Water (for recharging solvent tank).
4. Task lighting at workbench.
5. Compressed air (at workbench location).

criteria

1. Approximately 100 sq. ft. (see Guidance).
2. 110V duplex outlet plus equipment connection.
3. Cold water line.
4. 500 lux.
5. -

guidance

1. Central to shops and bays.
2. Locate out of circulation path; should not be fixed against a wall where solvent and grease will contaminate the wall surface.



3. No floor drain should be provided near the parts washer unit. Spills can be controlled on the floor surface, and the solvent should be prevented from entering the sanitary sewer, storm sewer, or waste system.

DI 17

OM-8

RETROFIT EXTERIOR VEHICLE SERVICE BAY

function/purpose

Vehicle Lubrication and Cleaning. The routine vehicle lubrication and power pack cleaning requires fast, efficient throughput to maintain vehicles in a combat-ready condition with the limited number of personnel assigned. This facility is recommended as an exterior workstation to be built at existing CEGE installations where vehicle cleaning and servicing cannot be effectively accomplished with the existing facilities.

issues and assumptions

1. Exterior maintenance facility equipment:

   a. Wastewaters generated by the low-pressure, high-volume washing of tactical equipment should be segregated from maintenance cleaning wastewater for economy of wastewater treatment. A centralized tactical vehicle wash facility should be provided for the exterior and possibly the interior washing of vehicles returning from field operations. (See "Wash Rack" sheets.)

   b. Provision of power pack dollies for M-60 and APC tracked vehicles. would significantly improve the efficiency of tracked vehicle maintenance operations and reduce oil spillage.

   c. Both hot-water washers and power pack dolly systems should be provided at exterior maintenance bays. However, it is desirable from a training standpoint to perform engine and pack removals with on-hand retriever equipment.

activities

1. Crankcase and transmission oil change.
2. Engine, engine pack, and engine compartment cleaning.
3. Large component parts cleaning.
4. Vehicle inspection cleaning.
5. Radiator flushing.
6. Gun tube cleaning.
7. Wheeled-vehicle undercarriage washing.

personnel

equipment

Grease rack with waste oil collection funnels (wheel).

Cut-off 55-gal. drum (track).

Wash hose.

requirements

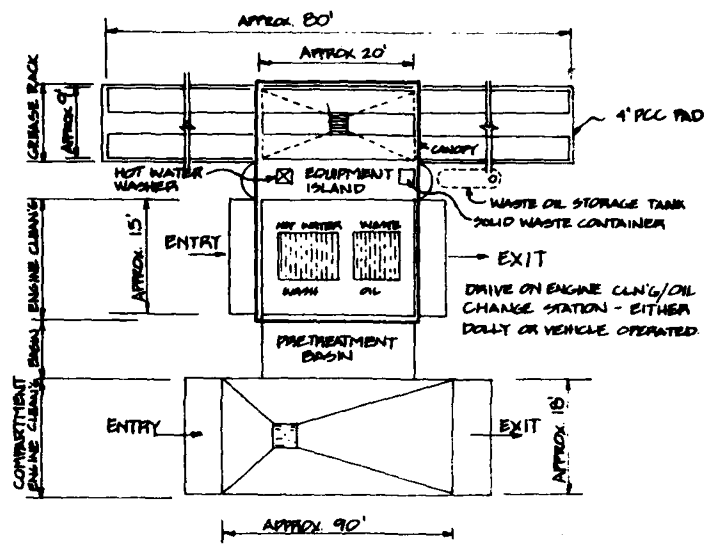
1. Lighting for 24-hr. operation.
2. Waste oil handling and storage.
3. Water supply (hot).
4. Stormwater drainage control and wastewater line.

criteria

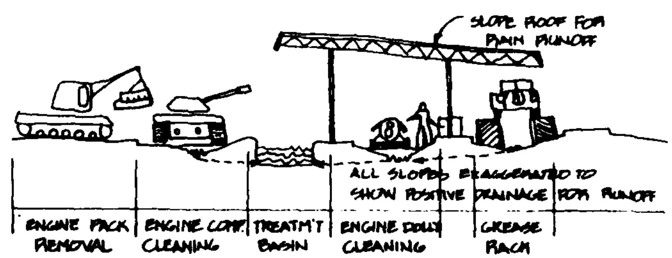
1. 200 lux under canopy.
2. 1000-gal. vented tank with provision for external pump and an access manhole for sludge clean-out.
3. 4 to 5 GPM @ 1100 psi.
4. See "Waste Treatment" sheets.

guidance

Co-located with POL storage and maintenance shops.



PLAN-GENERAL PURPOSE MAINT. BAY · EXTERIOR



EXTERIOR · GENERAL PURPOSE MAINT. BAY

DI 17

OM-9
TRACK AND GUN SIGHT SERVICE AREA

function/purpose

Changing of Worn or Damaged Track and Gun Sight Calibration.

issues and assumptions

1. Interior vs. exterior location for this function:

Currently, outdoor service areas are determined by user need to perform "routine" maintenance which includes activities such as engine pack pulling, track changing, etc. "Routine" maintenance activities other than track changing (and in some instances gun tube inspection and replacement) and sight calibration should be performed inside the maintenance building. An exterior area for track changing and tank-gun synchronization should be designated within the maintenance complex because of the area required for laying out track and the distances needed for target sighting during the tank-gun synchronization operation.

activities

1. Track changing.
   a. Break track.
   b. Back vehicle off track.
   c. Re-pack road wheel bearings.
   d. inspect drive sprockets.
   e. Reverse or replace drive sprockets.
   f. Replace track.
   g. Re-link.
   h. Drive vehicle on track.
2. Gun site calibration.
3. Gun tube inspection (optional).
4. Gun tube replacement (optional).

personnel

3 crew members

equipment

1. Road wheel arm lifter.
2. Lighted gun inspection tube (optional).
3. Wrecker with pipe strap (optional).

requirements	criteria
1. Hard, flat surface, adequate for withstanding tracked vehicles.	1. Concrete.
2. Adequate space.	2. See Guidance.
3. Adequate lighting to perform minor maintenance.	3. 300 lux at work surface.
	4. 7-ft.-high chain link fence.
4. Track storage area must be secured.	
5. Synch ramp for tank gun synchronization having adequate field of view for target sighting.	5. 15-degree solid concrete ramp sized and designed to support the entire body and weight of the heaviest combat tank and placed with adequate field of view for target sighting.

guidance

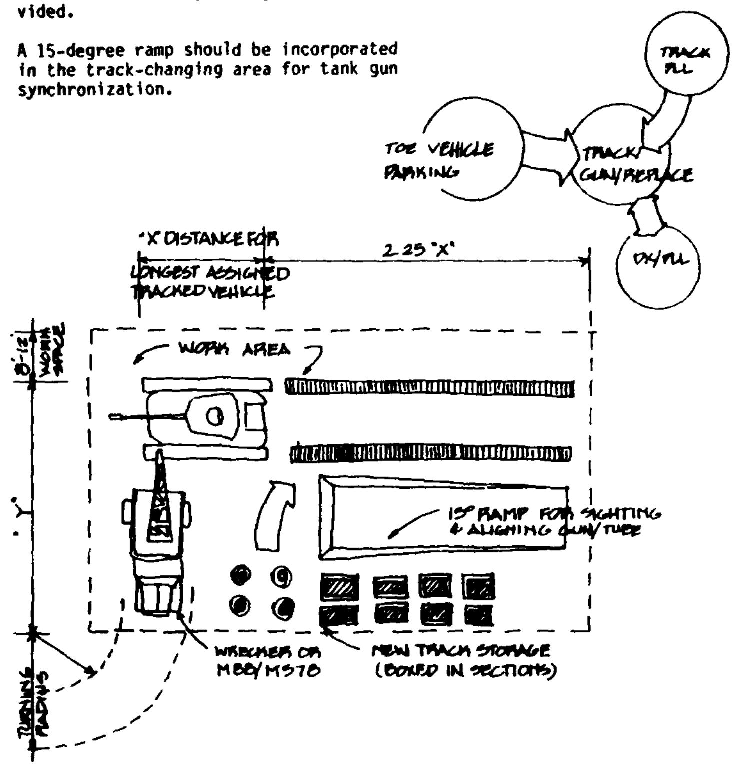
1. The area of changing track should be at least the (total) length of the longest tracked vehicle assigned to the unit, plus one track length.

2. This area should be at least as wide as the widest tracked vehicle.

3. Ample working space around the vehicle and space for track storage should be provided.

4. When the space is to be used for gun tube replacement, adequate area for maneuvering and parking a wrecker or similar vehicle at a 90-degree angle to the gun tube should be provided.

5. A 15-degree ramp should be incorporated in the track-changing area for tank gun synchronization.



DI 17

OM-10

ADMINISTRATIVE OFFICE AREA

function/purpose

Administration of Maintenance Operations.

issues and assumptions

1. Administration of shops can be separated into two areas:

   a. Persons handling supervisory, paperwork, work orders, etc. These individuals can be located on the second floor of a shop area. They should have a window-type view to the wheel and track bays. Supervisors should have enclosed offices. Others can work in an open area with a common shared view of the bays.

   b. Foremen for the track and wheel shops should have their own offices on the first floor with views to the bays they supervise.

activities

1. Supervision/control.
2. Recordkeeping.
3. Job order processing.
4. Library of reference manuals.

personnel

1 - Military.

2 - LN.

6 - Supervisors.

2 - Shop foremen.

equipment

1. Desks with chairs at each workstation.
2. Files--4-drawer.
3. 2 cabinets, 18 in. x 48 in. x 60 in. high.
4. Book cases - 15 in. x 120 in. x 72 in. high.

requirements

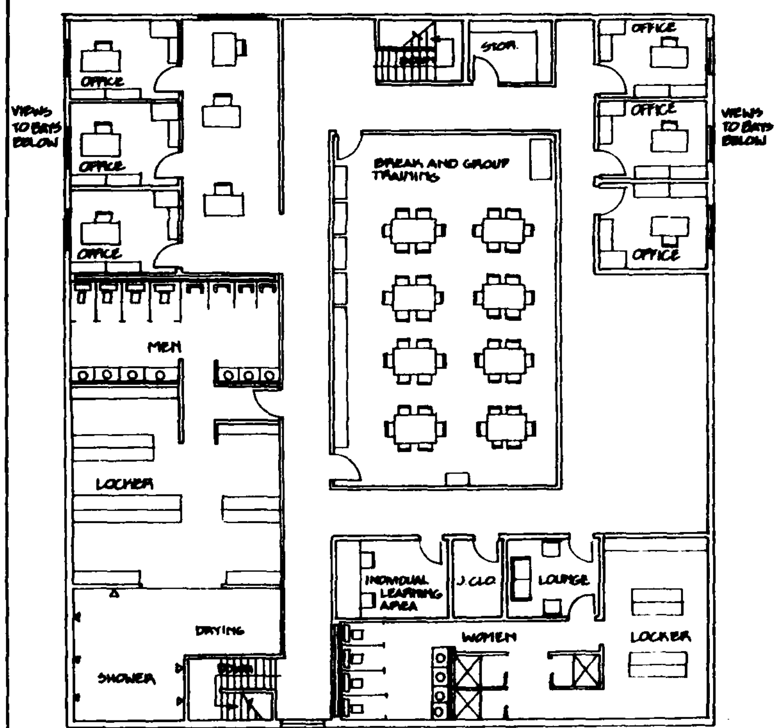
1. Adequate space.
2. Power.
3. Lighting.
4. Heating, cooling, ventilation.
5. Communication.

criteria

1. 80 to 90 sq. ft. per person, with additional space for equipment and files.
2. Duplex outlets at each 10 ft. of wall.
3. 500 lux with fluorescent fixtures.
4. $20^{o}C$ during winter; 10 air changes per hour.
5. Telephone and intercom to shop areas.

guidance

1. The supervisory personnel must be able to observe the work areas. It is preferable that the administrative office space be located on the second floor, and have windows in all walls.



DI 17

OM-11
MAINTENANCE SUPPLY AREA

function/purpose

Storage of Floor Drying Compounds, Clean and Dirty Shop Towels (Janitor's Closet).

issues and assumptions

activities

1. Receiving.
2. Inspection.
3. Placement.
4. Storage/inventory.
5. Dispensing.

personnel

None.

equipment

1. Shelves (20 lin. ft.).
2. Containers with lids (clean 55-gal. drums).
3. Service sink.
4. Hooks.

requirements	criteria	guidance
1. Adequate size.	1. 70 to 100 sq. ft. Minimum space to accommodate requirements based on size and number of items to be stored.	Location: Should be central to common-use areas of the facility and provide access to general circulation; should be near the tool room and latrine. Clean towels can be dispensed from the tool room. The floor drying compound and the dirty towel containers (drum) can be located outside the tool room. Brooms, mops, cleaning supplies, etc., should be secured in the "janitor's closet."
2. Illumination.	2. 100 lux (use incandescent fixtures).	
3. Service sink.	3. Hot and cold water.	
4. Environmental control.	4. 20°C during winter.	

DI 17

OM-12
TOOL AND TEST EQUIPMENT STORAGE

function/purpose

Storing Tools and Specialized Test Equipment Used by Quality Control Personnel. The tool box storage area is general shop space in which personnel can store tools and miscellaneous items which are not being used. If required, provide administrative space for tool control clerk.

issues and assumptions

1. Personnel will always need a place to lock up their tools. The number and size of the tools and the number of tool boxes will depend on the type of vehicles being maintained and the number of personnel assigned to the maintenance function.

activities

1. Receiving.
2. Inspection/inventory.
3. Storage/placement.
4. Issuing (checkout).

personnel

equipment

1. Desk with chair.
2. File - 4-drawer.
3. Chalkboard, 4 ft. x 4 ft.
4. Locked cabinet (18 in. x 48 in. x 72 in. high).
5. Peg boards (40 in. x 96 in.)
6. Cabinet with small drawers.
7. Bench with shelf.
8. Shelving (amount varies with unit).
9. Battery tester.
10. Timing equipment.
11. Electrical testing equipment.
12. Desks (60 in. x 30 in.) and chairs for at least four personnel.

requirements

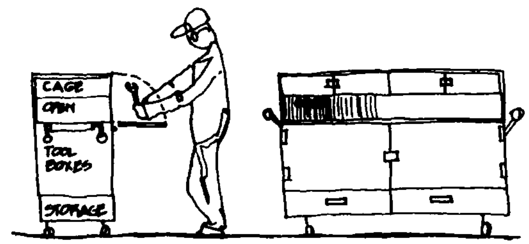
1. Adequate size and work station area.
2. Illumination.
3. Dutch door for dispensing tools.
4. Communications.
5. Power - coordinate power needs with user service.

criteria

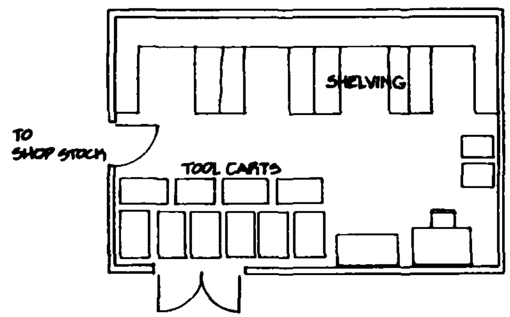
1. (400-450 sq. ft.) A minimum size should be determined and specified based on number and size of tools, bench stock, and tool boxes, etc., assigned to the unit; the size should be determined by the number of vehicles maintained.
2. 400 lux - fluorescent light fixtures.
3. 3-ft. door.
4. Telephone.
5. 110V outlet each wall.

guidance

1. Each person (or 2 to 3 people) could have a cart similar to the sketch below, or the Company could have one or two large carts where tool boxes could be secured. The cart could be loaded for deployment. (It might be possible to provide enough space on one or two carts to store some supplies and PLL items.)



TOOL CART DESIGN



DI 17

OM-13
DX AND SHOP STOCK STORAGE

function/purpose

Direct Exchange (DX) of Parts, and Receiving, Storing, and Issuing of Repair Parts/Shop Stock for All Vehicles.

issues and assumptions

1. DX and shop stock consists of a customer service area, a catalog area, and a bin storage area for receiving unserviceable parts and issuing replacement parts and components. DX and storage is normally located with other supplies and equipment adjacent to the common use vehicle bays. Access to outside or common circulation is required to give all personnel access.

activities

1. Receiving.
2. Inspection/inventory.
3. Placement/shelving.
4. Dispensing.

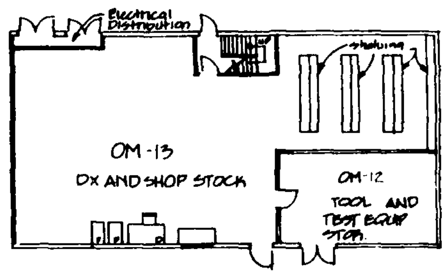
personnel

equipment

1. Desk with chair (table required if desk and chair are at another location).
2. File cabinet - 5-drawer.
3. Parts, bins, shelving.
4. Additional equipment may be needed to move parts and position them in the storage area and to dispense them. Also, containers may be needed to pack parts for deployment.
5. Microfiche viewer.
7. Reference library.
8. Space/equipment needed in section areas.
   a. Space for lazysusan-type revolving bins.

requirements	criteria
1. Room sized for extent of DX and shop stock.	1. 2000 sq. ft.
2. Environmental control.	2. 20° C during winter.
3. Illumination.	3. 300 lux at vertical shelving.
4. Check-out window.	4. 3-ft. x 3-ft. area--may be a dutchdoor (accessible to/from bays).
5. Double doors, located in an exterior wall (or to a maintenance bay) for movement of parts into and out of the building.	5. 6 ft. opening width.
6. Adjustable loading dock.	6. 3 ft., 10 in. at receiving/issuing points.
7. Communications.	7. Telephone.

guidance



DI 17

OM-14
BREAK AND GROUP TRAINING AREA

function/purpose

Personnel Training and Work Break Activities. A break, training, and conference area should be provided at a central location in the building where persons can assemble for daily work breaks and periodic group training sessions.

issues and assumptions

1. Flexibility of Break, Training Facilities:

Adequate space (area) for breaks, training, and/or conferences is required. Most facilities have fixed-wall construction on interior walls. Movable walls would allow flexibility in space allocation.

activities

1. Training classes.
2. Breaks.
3. Conferences.

personnel

Could include all personnel working in the building, probably in groups of 20 percent of assigned maximum.

equipment

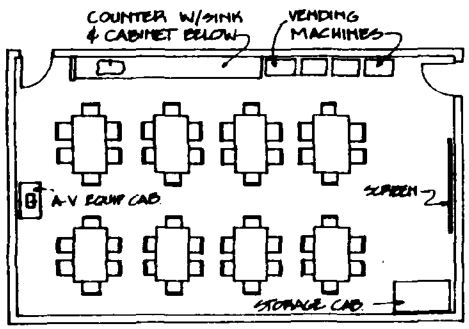
1. Tables with side chairs.
2. Vending machines.
3. Drinking fountain.

requirements	criteria
1. Adequate size.	1. Approximately 900-1000 sq. ft.
2. Smoking area ventilation (must be physically separated from vehicle bays).	2. Ventilation - 10 air changes per hour.
3. Power.	3. Provide one 120V-20A duplex receptacle for each vending machine. Minimum of one on each wall.
4. Water sources for drinking fountain and coffee machines.	4. —
5. Illumination.	5. 500-lux, fluorescent ceiling fixtures, with one fixture at rear of space switched separately for minimum light level for AV presentations.
6. Communication.	6. One wall telephone.
7. AV screen.	7. 8-ft. x 8-ft. pulldown screen.

guidance

1. Example: A room 35 ft. x 35 ft. (or 1225 sq. ft.) will provide adequate space for tables and chairs, plus some standing room or space for vending machines and adequate distance for AV presentations.

2. The use of second-floor space for office area, conference rooms, etc. would release area on the ground floor for other activities.



DI 17

OM-15
INDIVIDUAL LEARNING AREA

function/purpose

Individual Learning Area.

Training aids are available for almost all maintenance operations. It is important for all personnel to use them periodically to learn about new maintenance equipment and practices.

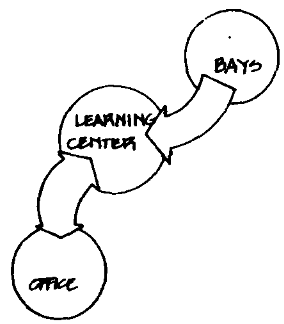
issues and assumptions

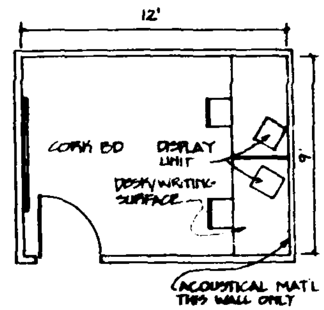
activities	personnel	equipment
1. AV cassette viewing. 2. Reading.	2 (at one time)	1. 2 tables or carrel units (24 in. x 48 in.) with chairs. 2. 2 AV cassette viewers. (Bessler-QC carrels). 3. Cassette files.

requirements	criteria
1. Adequate space.	1. Approximately 100 sq. ft. (see Guidance).
2. Illumination.	2. 600 lux (fluorescent fixtures).
3. Electricity.	3. 110V duplex outlet for each carrel.
4. Environmental control and ventilation.	4. $20^{o}C$ during winter.

guidance

1. Set up a small room in an isolated area. One or two persons at a time will use the room.
2. The cassettes are normally maintained at the learning center.
3. The learning center could be located in an isolated area near the break area, or could be a part of the break area if isolation can be provided.





DI 17

OM-16
LATRINES/LOCKER/SHOWER ROOMS

function/purpose

Latrines, Showers, and Locker Rooms for Facility Personnel Use.

issues and assumptions

Toilet facilities shall be provided for men and women:

1. Water consumption: In some locations, reducing water consumption is important. On military facilities, the installation of water-saving devices in latrines would reduce the amount of water that is used without affecting the operation of the equipment. This is especially important in geographic areas where water supplies are dwindling; in addition, it reduces water supply costs at all military installations.

activities

1. Washing.
2. Eliminating.
3. Self-grooming.
4. Personal storage.

personnel

All the personnel assigned to the facility; visitors.

equipment

1. Wash basins/soap holders.
2. Showers.
3. Urinals/water closets.
4. Mirrors.
5. Paper towel holders.
6. Lockers, benches.
7. Wastebaskets.

requirements

1. Illumination.
2. Power.
3. Plumbing fixtures.
4. Temperature.
5. Adequate ventilation.
6. Adequate size.

criteria

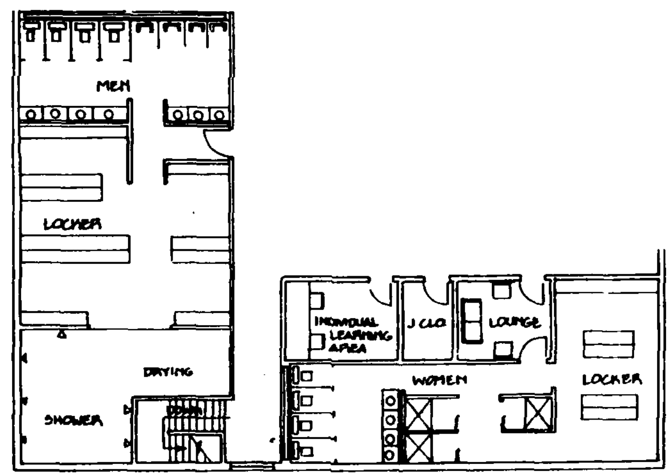
1. 250 lux.
2. 110V at least 24 in. above finished floor; (one 20A duplex/wall).
3. Provide water closets, urinals, and wash basins. Install water-saving devices in water closets, faucets, and showers.
4. $20^{\circ}C$ during winter.
5. 4 air changes per hour.
6. Space allocation.

	Men	Women
Latrine	225	150
Locker Room	750	200
Shower Room	150	50

guidance

1. Use fluorescent fixtures for lighting.
2. Latrines should be centrally located and accessible from exterior and interior work areas.
3. Latrines should be provided in each inhabited building within a complex.
4. Latrines should be located in the parts of the building constructed as shop or office space.

There are a number of different types of water-saving devices produced by commercial manufacturers that can be installed in water closets, faucets, and showers.



DI 17

OM-17
POL STORAGE

function/purpose

POL Storage.

This space is used to store flammable materials required by the CEGE unit occupying the complex.

issues and assumptions

1. Bulk fluids storage and dispensing in bays:

Current practice involves numerous transfers of POL products from the storage area to the maintenance location (building or exterior locations). These transfers involve substantial duplication of effort by users and loss of product. Bulk storage and dispensing systems for commonly used POL and other products (i.e., antifreeze) would eliminate current inefficiencies in fluid transfers. Such systems would also reduce POL (flammable) storage requirements.

2. Determination of POL storage area in building.

Area allocation for POL storage facilities is presently based on the number of vehicles assigned to the organizational unit only. In addition to vehicle numbers, other factors which should be considered in determining POL storage requirements are vehicle types and the number and diversity of vehicles. Storage area requirements should be based on consideration of the volumes and types of package products required to service vehicles within the unit.

activities	personnel	equipment
1. Fill. 2. Test and analyze. 3. Remove.	(As required.)	1. Handling device(s) for 55-gal. drums and/or case lot stock. 2. Hand-regulating drain faucets/dispensers for each type of POL.

requirements

1. Adequate space.
2. Spillage containment and fire-proof.
3. Lockable doors (preferably double wide).

criteria

1. Approximately 150 sq. ft. per building based on assumption of adequate bulk storage.
2. Enclosure type based on regulations applicable to storage of flammable products.

guidance

1. Determine the total volumes of specific POL products required to perform a routine maintenance in accordance with schedules or practices:

a. Example:

(1) Total number of each vehicle type; e.g., four 1/4-ton jeeps, three 2 1/2-ton trucks.

(2) Type(s) of POL product used in each vehicle type.

(3) Quantity of POL product used in each vehicle type.

(4) Frequency of use of POL product for each vehicle type determined from SOPs, TMs, etc.

(5) Other factors, i.e., POL, product additions, ordering and delivery time, convenience, etc.

(6)

	Vehicle Type	Total No. of Vehicles	Product Type	Capacity	Frequency of Use	Other
Example:	1/4-ton Jeep	4	*m*	5 qt.	Quarterly	1 qt./mo. addition

Summation:

(7) Four 1/4-ton jeeps x 5 qt. oil type *m* = 20 qt. oil type m
20 qt. oil type m/vehicle x 4 times/yr. = 80 qt. oil type m/veh/yr.
1 qt. oil type m/veh/mo x 12 = 12 qt./oil type mo/veh/yr.
12 qt. oil type m/veh/yr x 4 veh = 48 qt. oil type m/veh.
80 qt. oil type m/veh/yr + 48 qt... = 128 qt. oil type m per yr.

(8) Repeat procedure for each vehicle type.

(9) Determine type of products to be stored in bulk based on factors in item 1.

(10) Determine cubic volume of storage area needed for each product.

(11) Determine products used for storage in drums or small containers which can be stored in the facility.

DI 17

OM-18 MACHINE SHOP

function/purpose

Fabricating Miscellaneous Track and Wheel Brackets, Hose Lines, and Fittings as Required.

issues and assumptions

1. Machine shop location:

   Work in the machine shop supports ongoing work in the bays. The machine shop must be close or central to the bays, yet must also be lockable and have its own storage.

activities

1. Grinding.
2. Rough cut.
3. Fabrication.
4. Turning
5. Drilling.

personnel

equipment

1. Small grinder.
2. Large grinder.
3. Small drill press.
4. Large drill press.
5. Hydraulic press.
6. Lathe.
7. Work tables and storage.

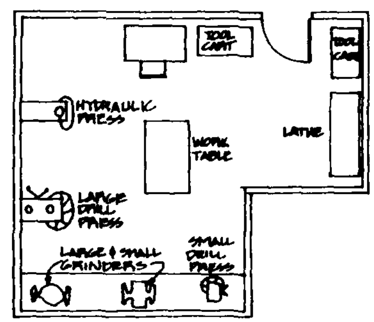
requirements

1. Adequate space.
2. Mechanical HVAC.
3. Electrical.
4. Lighting.

criteria

1. Shop area should be about 20 ft. x 20 ft. or 400 sq. ft.
2. 20°C during winter.
3. 110V-220V.
4. 500 lux at the work surface supplemented by task lighting on machines.

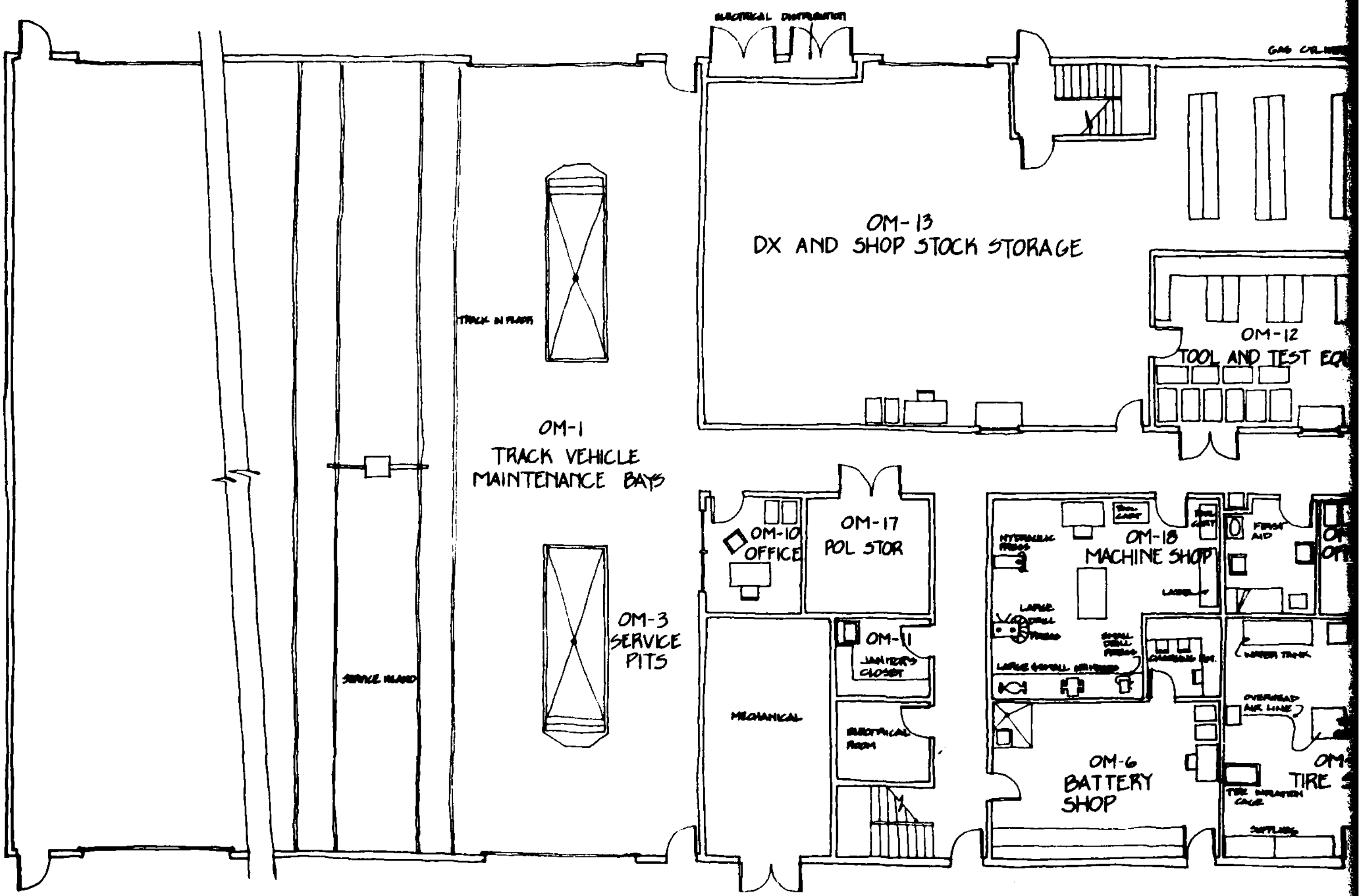
guidance

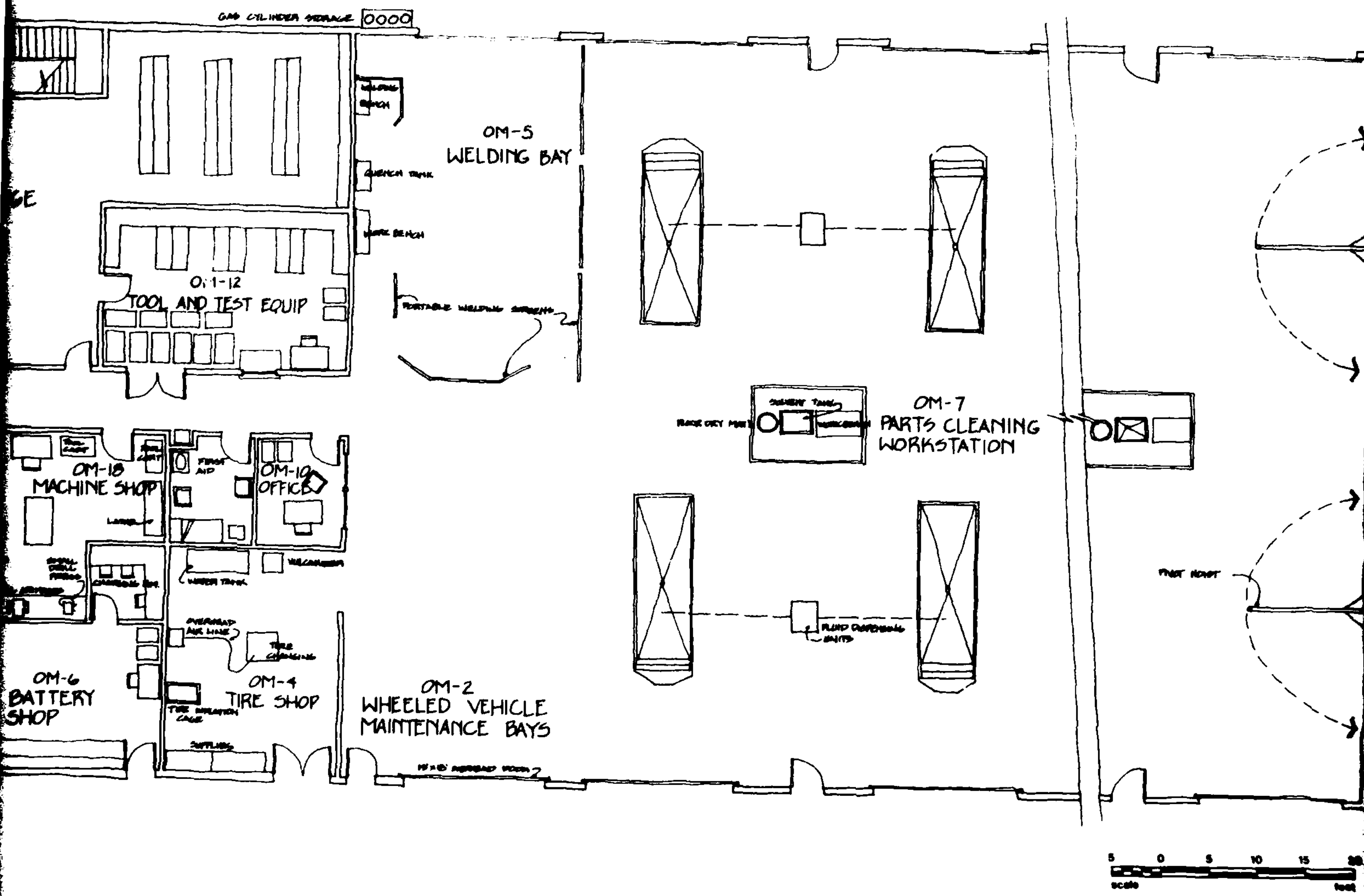


NOTES

Facility Layout Concept

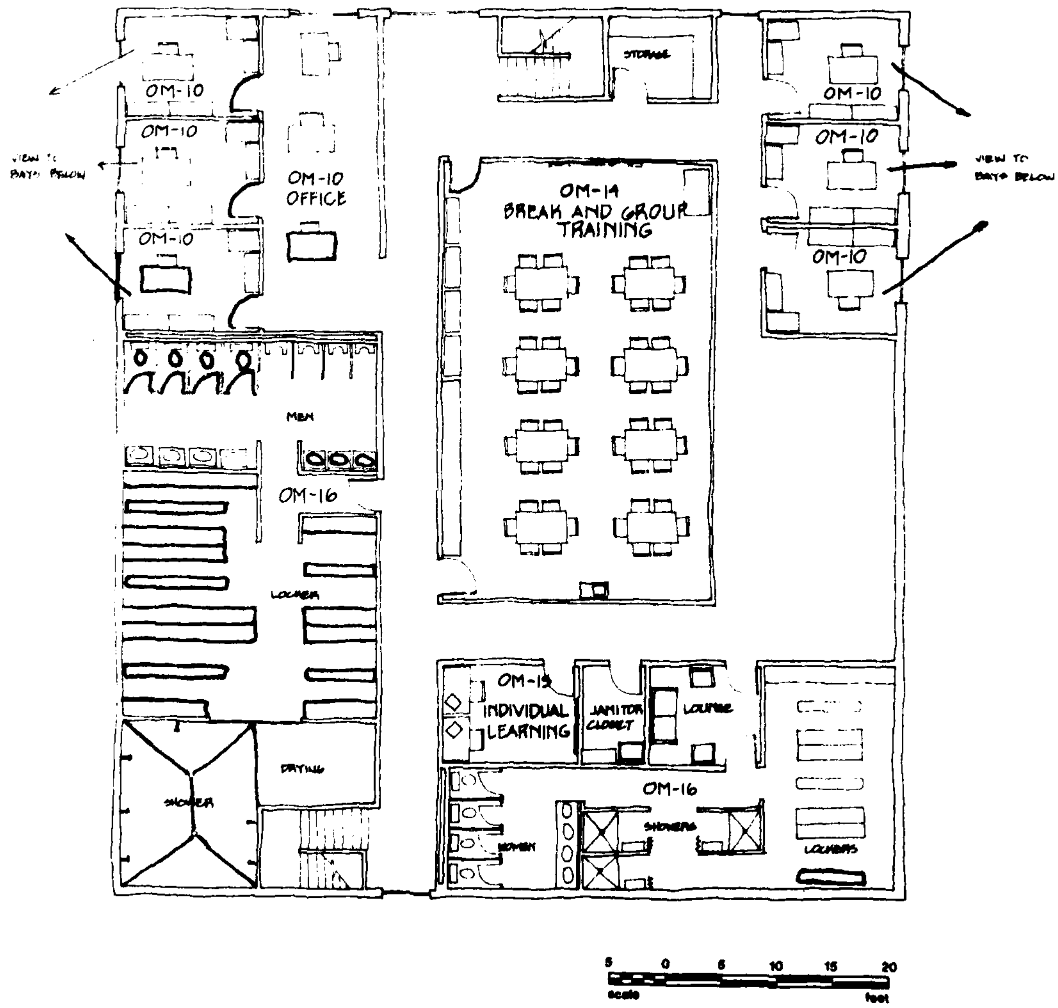
Vehicle Maintenance




GAS CYLINDER STORAGE
OM-5
WELDING BAY
QUENCH TANK
WORK BENCH
OM-12
TOOL AND TEST EQUIP
PORTABLE WELDING SCREENS
OM-7
PARTS CLEANING
WORKSTATION
SOLVENT TANK
OM-18
MACHINE SHOP
FIRST AID
OM-10
OFFICE
WATER TANK
OVERHEAD AIR LINE
TIRE CHANGING
OM-6
BATTERY
SHOP
OM-4
TIRE SHOP
TIRE INFLATION CAGE
SUPPLIES
OM-2
WHEELED VEHICLE
MAINTENANCE BAYS
FLUID DISPENSING UNITS
5 0 5 10 15 20
scale
feet

Facility Layout Concept

Vehicle Maintenance - Second Floor

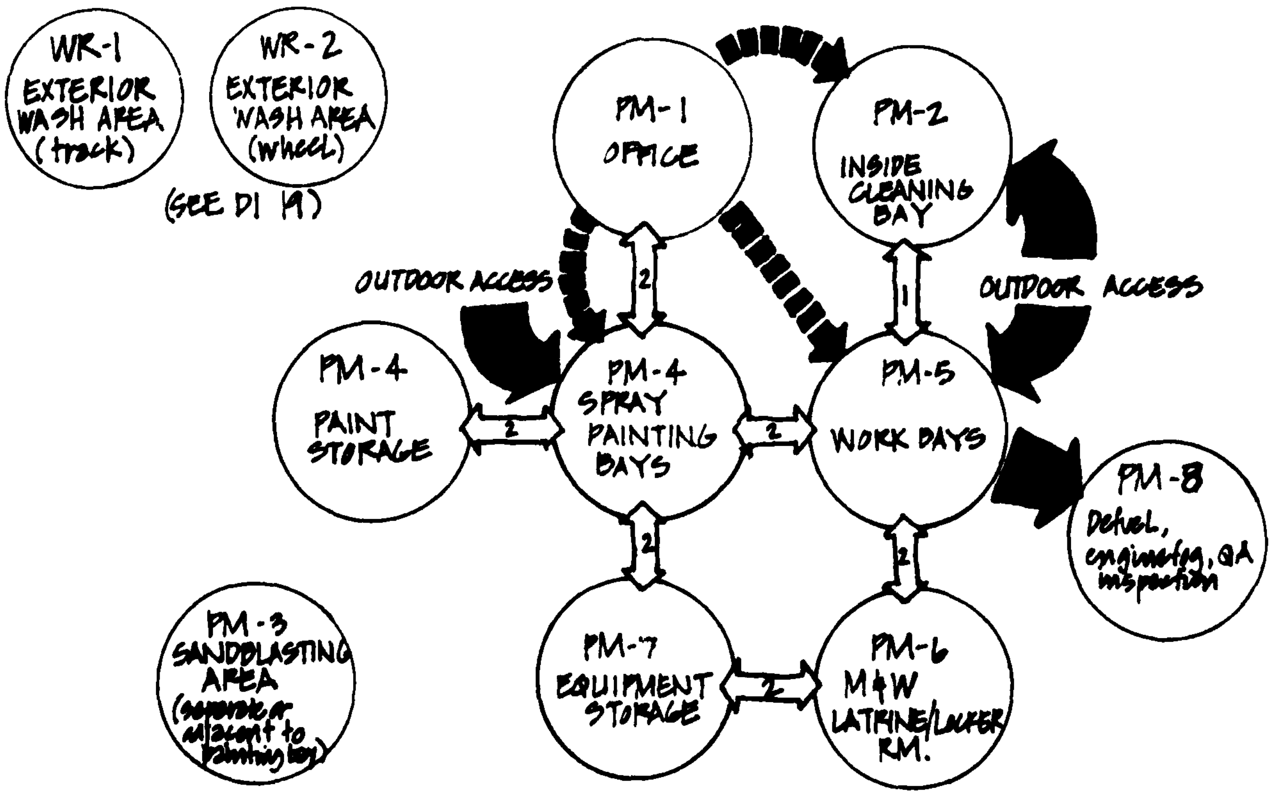


Literature Information

Mechanical Preservation Facility	18.2
Class III Supplies Storage Facilities: Defuel Pads	18.8

User Information

PM-1	Administration	18.10
PM-2	Inside Cleaning Bay	18.12
PM-3	Sandblasting	18.14
PM-4	Painting	18.16
PM-5	Work Bay	18.18
PM-6	Latrine/Locker Room	18.20
PM-7	Equipment Storage	18.22
PM-8	Exterior: defuel, engine fog, QA Inspection	18.24
	Facility Layout Concept	



PURPOSE

5.1 This facility shall be PROVIDED to preserve and maintain vehicles and equipment. (2)

ISSUES and ASSUMPTIONS

5.2 If the primary water supply required to satisfy the above demand is inadequate, or is not available, ground level storage points or open tanks will be PROVIDED. (2)

1. Examination and evaluation of existing structures (11):

   If existing buildings are being considered for reuse as POMCUS facilities it is necessary to analyze the renovation costs against "new construction" costs. Major costs have been required to make existing buildings responsive to POMCUS activities; especially,

   1) adequate insulation for temperature controlled buildings,

   2) structural adequacy for lift capacities in maintenance facilities.

REQUIREMENTS

a) 5.1 The facility shall be provided with sandblasting areas, waterfall spray painting bays, drying bays, defueling bays with lifts, and engine fogging (preservation) bays to maintain and preserve any part or all of a vehicle up to 11 m long and 4 m wide. These areas shall be separated from the remainder of the building by fire walls and fire doors and the building shall contain an automatic fire sprinkler system. (2)

b) 5.2 The facility shall be PROVIDED with a sandblasting room to allow cleaning of any part or all of a vehicle 11 m long and 4 m wide without having to reposition it. A second room is also provided to allow the facility to handle smaller vehicles. A ventilation system will be PROVIDED to filter the air before exhaust, as required to comply with local regulations. *The walls of the* room will be covered to prevent damage during normal operations and each end of the booth will have roll-up rubber curtains. (2)

CRITERIA

a) 5.1 Vehicle lifts will have 18.5 metric ton capacity. (2)

b) 5.2 The sandblasting rooms will contain an open-grate floor which allows the abrasive sandblasting grit to drop into a collection system and be reused. (2)

GUIDANCE

DESIGN INFORMATION

REQUIREMENTS

c) 5.5 Sound suppression will be PROVIDED in sandblasting areas to avoid hearing damage to workers and provide a proper work atmosphere for adjacent facilities. (2)

d) 5.3 The spray painting bays shall be PROVIDED with waterfall filters. This will allow application of a good quality painting in the same facility as the sandblasting operation. (2)

e) 5.4 A small office space and toilet shall be PROVIDED for the personnel operating the facility. (2)

f) 5.6 Centralized compressed air system and compressor equipment for running the paint spray and sandblasting equipment shall be PROVIDED. (2)

g) 5.7 Underground tanks for storage and recovery of drained POL wastes shall be PROVIDED.

h) 1.2 Oil separators will be PROVIDED on floor drains from all vehicle areas. (2)

i) 1.12 In areas of POL, bottled gas storage, or any potentially fire hazardous areas, explosion proof wiring and fixtures shall be PROVIDED, along with adequate ventilation system. (2)

CRITERIA

g) 5.7 Separate 5,000 liter tanks for diesel, mogas, and lubricating oils shall be PROVIDED. (2)

h) 1.2 Oil separators will have a net capacity of 2.50 liters for each square meter of surface to be drained. (2)

GUIDANCE

REQUIREMENTS

j) 1.10 In areas of flammable storage of such materials as POL petroleum products or other materials which would not be suited to fire extinguishment by water, dry-chemical or CO_2 system or extinguishers shall be PROVIDED.

k) 3.5 The lighting system shall provide minimum illumination intensities as follows: (2)

l) 3.4 All maintenance, storage, guard buildings and entrances to the site perimeter fence will be PROVIDED with lighting controlled by local switching. (2)

m) 3.5.5 Area lighting will be provided on all buildings & loading ramps.(2)

n) 1.4 Offices and shops not having natural ventilation will have mechanical ventilation. (2)

o) 5.1.2 DOMESTIC USAGE.A water distribution system for domestic and industrial usage will be PROVIDED ensuring an adequate rate of flow to all guard and administrative buildings, and to all maintenance facilities. (2)

CRITERIA

k) 3.5.2 250 lux inside of all maintenance, guard and administration facilities. (2)

n) 1.4 Mechanical ventilation will provide 10 air changes per hour, unless otherwise noted. (2)

GUIDANCE

DESIGN INFORMATION

REQUIREMENTS

p) 7.5.1 Illuminated access aprons, one per door of magazines and bunkers, (Class V utilizes interlocking concrete block), as well as illuminated concrete aprons (tracked vehicles) around the Maintenance Facility, Trades Building, Wash Racks, Grease Racks, and Non-Mechanical Maintenance Facility shall be of sufficient size to permit turning and backing for larger vehicles. (2)

CRITERIA

p) 7.5.2 All aprons will be constructed of rigid pavement, except around Class V magazines and bunkers as noted above. (2)

GUIDANCE

NOTES

PURPOSE

4.8.4.1 This facility shall be PROVIDED in order to drain fuel from vehicles prior to preservation operations. The facility is required in order to allow removal of POL as these materials cannot remain in vehicles to be stored. Facility shall also be used to fuel vehicles which cannot practically use the POL pump station. (2)

ISSUES and ASSUMPTIONS

a) 4.8.4.2 POL drained from vehicles is considered contaminated and will be collected for disposal. (2)

b) 4.8.4.5 Number of pads at each site shall be justified on a case-by-case basis, based on number of vehicles on the site and frequency of the defuel operations. (2)

1. Examination and evaluation of existing structures (11):

   If existing buildings are being considered for reuse as POMCUS facilities it is necessary to analyze the renovation costs against "new construction" costs. Major costs have been required to make existing buildings responsive to POMCUS activities; especially,

   1) adequate insulation for temperature controlled buildings,

   2) structural adequacy for lift capacities in maintenance facilities.

REQUIREMENTS

a) 4.8.4.3 Separate fuel/defuel pads shall be provided for diesel, mogas, and lubricating oils.

b) 4.8.2.2 The pads shall be PROVIDED with POL separators. (2)

c) 4.8.4.2 Underground tanks for collection of contaminated POL shall be PROVIDED. (2)

d) 3.5 The lighting system shall provide minimum illumination intensities as follows: (2)

CRITERIA

a) 4.8.4.4 Fuel/defuel pads shall be 600 square meters each. (2)

a) 4.8.4.5 These pads shall be designed to support a 19,500 liter tank truck which will be used to off load fuel from vehicles before storage or to fuel vehicles. (2)

b) 1.2 Oil separators will be PROVIDED on floor drains from all vehicle areas. Oil separators will have a net capacity of 2.50 liters for each square meter of surface to be drained. (2)

c) 4.8.4.2 These tanks shall have a 20,000 liter capacity. (2)

d) 3.5.4 50 lux at all outside storage areas, fueling points, work areas, and loading docks to allow for 24-hour operation of the site. (2)

GUIDANCE

4.8.4.3 Pads shall be concrete to prevent any of the POL from attacking and deteriorating the pads. (2)

DI 18

PM-1 ADMINISTRATION

function/purpose

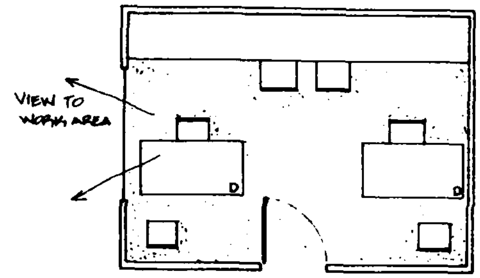
Administration of mechanical preservation.

issues and assumptions

activities	personnel	equipment
1. Receive and complete 2407s and 2405s.	1 - 63430.	2 - Desks with chairs.
2. Control flow of work.	1 - LN supervisor.	1 - Telephone.
3. Log hours spent on each job.		1 - Tub file.
4. Supervise 12 preservation servicers, 1 welder, and 1 sandblaster.		1 - Shelves 3 ft. long x 6 ft. high.
5. Vehicle inspections.	1 - LN supervisor as *above*.	Open area for wheeled and tracked vehicles.

requirements	criteria
1. Adequate space.	1. 10 ft. x 12 ft. (user est.).
2. Power.	2. 110V duplex outlets at each 10 ft. of wall.
3. Overview of operations from office space.	3. View to most of work area without leaving office.
4. Lighting.	4. 500 lux with fluorescent fixtures.
5. Heating, cooling, ventilation.	5. $20^{\circ}C$.
6. Communication.	6. Coordinate telephone and intercom needs with the installation.

guidance



PM-2
INSIDE CLEANING BAY

function/purpose

Vehicle and equipment washing prior to mechanical preservation and maintenance (inside the building).

issues and assumptions

1. Wastewater treatment:

   Washing of wheeled tactical equipment is presently performed using high-volume/low-pressure washing equipment on washrack hardstands that are generally subject to stormwater intrusion. The use of these areas for cleaning engines, engine packs, etc., with detergents, solvents, diesel fuel, and other agents further complicates the treatment of wastewaters. Adequate interior wash bays in the preservation facility using low-volume/high-pressure washing equipment would minimize wastewater treatment costs and provide for better working conditions during the winter months.

activities

1. Position vehicle in washrack.
2. Prepare vehicle by removing non-soluble debris.
3. Wet down vehicle.
4. Pick out mud from treads, etc.
5. Final wash of exterior.
6. Clean personnel compartment.
7. De-rust and spot paint.
8. Clean and service battery box.
9. Make minor body repairs.

personnel

5 personnel

equipment

1. Low-pressure/low-volume, hand-held hoses at interior cleaning stalls.
2. 1 steam cleaner.
3. 1 sharp bar (3 ft. long).
4. 2 grinders with wire brush attachments.
5. Solid waste containers at all interior cleaning stalls.

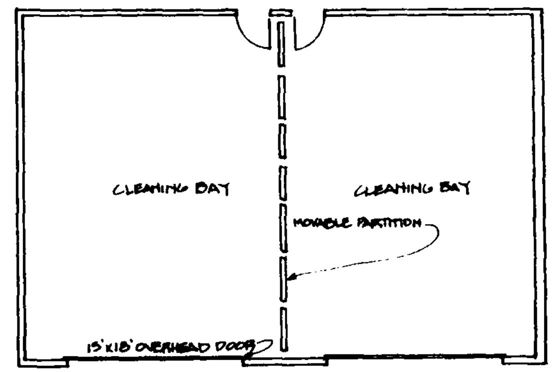
requirements

1. 2 bays large enough to hold the largest equipment on hand.
2. Power.
3. Water source with two outlets.
4. Positive draining.
5. Sufficient lighting to safely complete the job.
6. Working temperature.

criteria

1. Approximately 24 ft. x 32 ft.
2. 110V service.
3. Pressure: 100 psi at nozzle; volume: 20 gal./min. (2 to 4 gal./ min. for interior cleaning).
4. Bays constructed of sloped concrete, with drain having water/oil separator.
5. General lighting 300 lux with retractable trouble lights.
6. 20°C. during winter.

guidance



DI 18

PM-3
SANDBLASTING

function/purpose

Mechanical preservation sandblasting.

issues and assumptions

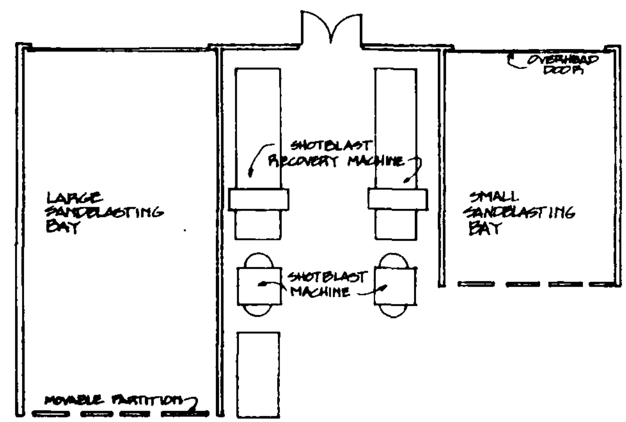
activities	personnel	equipment
1. Cover all glass.	1 - Sandblaster.	1. Abrasive blasting machine.
2. Sift material.	1 - Assistant	2. Sifting screen.
3. Fill blasting machine.		3. Shot blast machine.
4. Sandblast vehicle.		4. Shot blast recovery machine.
5. Remove material from vehicle.		

requirements	criteria
1. 2 bays to contain 2 large vehicles.	1. 1 bay approximately 18 ft. wide x 40 ft. long and 1 bay 16 ft. wide x 40 ft. long.
2. Area to contain sandblasting machine and material.	2. 16 ft. wide x 40 ft. long bay.
3. Vehicle door to outside of bay.	3. 14 ft., 0 in. minimum width.
4. Door to bay for sandblaster and material.	4. 3-ft. x 7-ft. personnel door.
5. Means to supply air to personnel doing sandblasting.	5. Negative air pressure through an exhaust system with makeup air duct.
6. Power.	6. 110V and 220V service.
7. Lighting.	7a. Flexible lighting units to locate "hidden" rust areas. General lighting 300 lux. b. Shatterproof fixtures and lens.
8. Blast particle reuse.	8. Floor slightly "V" shaped with hole in the floor to collect material. Means needed to sift and transport material back to sandblaster.
9. Constant air supply sufficient to operate sandblaster.	9. --

guidance

1. Shop must be completely enclosed to prevent material from entering other shop areas.

2. Shop should have some means of letting other personnel know when it is in operation in order to prevent possible injury to people entering the area.



DI 18

PM-4 PAINTING

function/purpose

Mechanical preservation painting.

issues and assumptions

activities

1. Inspect vehicle.
2. Mix paint.
3. Spray vehicle.
4. Remove tape and paper from glass.
5. Paint storage.

personnel

1 - painter

1 - assistant

equipment

1. Storage shelves for paint and thinners.
2. Storage shelves for paint buckets.
3. 5-gal. spray gun with cup.
4. Brush storage racks.
5. Paint compressor.
6. Waste containers.

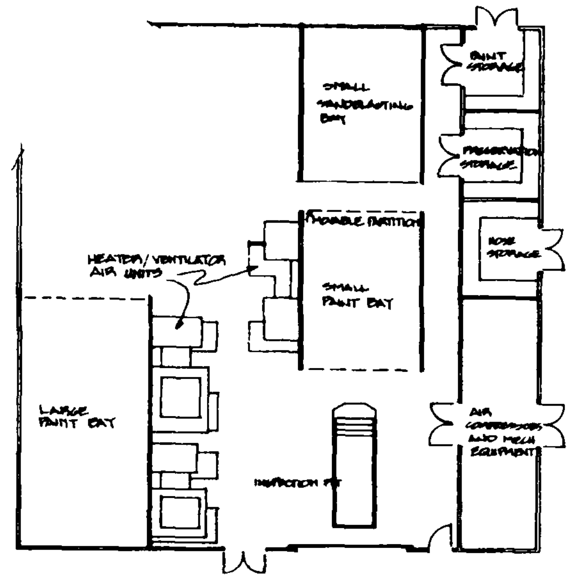
requirements

1. 2 bays for major painting.
2. Small paint bucket storage area.
3. Small equipment storage area.
4. Doors large enough to permit vehicle to enter bay.
5. Ventilation system.
6. Power.
7. Outlets for droplights and other electrical equipment.
8. Lighting.
9. Warning light or sign for use when painting operations are in progress.
10. 1 shed for paint or part of building with exterior access.
11. 1 shed for POL.
12. HVAC
13. Sheds must be lockable when unmanned.
14. Service sink.
15. Service pit (for under carriage inspections.)

criteria

1. Approximately 24 ft. x 32 ft. each.
2. 3-ft. x 10-ft. storage shelves.
3. 3-ft. x 10-ft. area.
4. 15 ft. x 18 ft. high.
5. Negative air pressure through an exhaust system.
6. 110V and 220V service.
7. Duplex outlets, 20 ft. o.c. minimum.
8. Shatterproof fixtures. 400 lux
9. Red light at all door openings.
10. Approximately 100 sq. ft., with 10 ft. ceiling height.
11. Approximately 100 sq. ft., with 10 ft. ceiling height.
12. Positive pressure circulation to prevent excessive heat buildup. 20°C during winter.
13. ----
14. Cold water.
15. See sheet "OM-3".

guidance



DI 18

PM-5
WORK BAY

function/purpose

Vehicle preservation work bay.

issues and assumptions

1. Number of Bays Required:

Assumptions	Factor
track vehicle avg. 2 hrs with 50 week yr.	.006
Wheel vehicle avg. 3 hrs with 50 week year	.004
Trailer avg. 15 day with 250 day work yr.	.002
64% of CHW stored equipment is rotated for maintenance annually	
89% of trailers stored outside is rotated for maintenance annually	

[wheel x .64 x 01] + [track x .64 x .02] + [trailer x .89 x .002] = N
(total in CHW) (total in CHW) (total in ext)

Number of maintenance bays required = N

activities

1. De-rusting.
2. Spot painting.
3. Check oil level.
4. Check antifreeze and stencil on hood.
5. Remove batteries, clean and preserve battery box.
6. Talc rubber seals.
7. Remove drain plugs.
8. Drain air tanks.
9. Preserve winch cables.

personnel

Variable - dependent on nature of task demand.

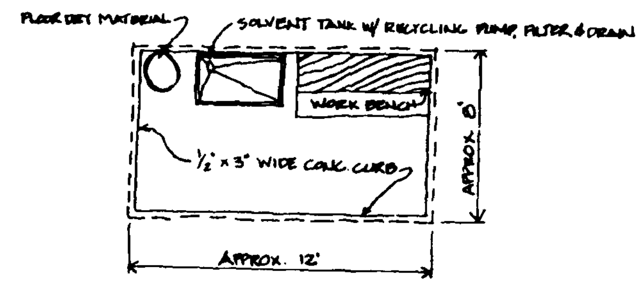
equipment

1. Tool kit.
2. Jacks, portable or fixed.
3. Solid waste storage.
4. Fluid-dispensing system with retractable hoses.
5. Recirculating small parts solvent washer.
6. "Floor dry" compound in container.
7. 3-ft. x 6-ft. workbench.

requirements	criteria
1. 14 bays large enough to hold largest type of equipment serviced unless it is a one-of-a-kind or a special item.	1. Approximately 24 ft. x 32 ft. each.
2. At least one bay should have a pit which would be covered when not in use.	2. See "Service Pit" OM-3.
3. Power.	3. 110V service.
4. All bays should be well lighted.	4a. All lighting should be shatterproof b. General lighting 300 lux with retractable trouble lights.
5. Compressed air (at workbench location).	5. -----
6. Water (for recharging solvent tank).	6. Cold water line.

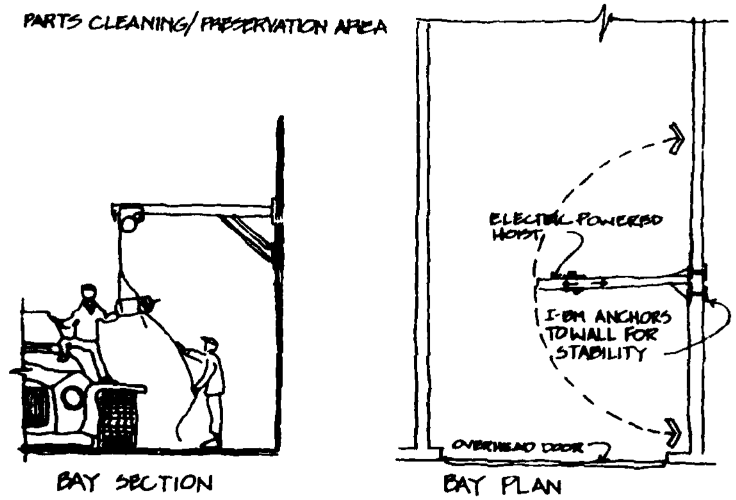
guidance

1. Central to Company or Battalion shops and bays.
2. Located out of circulation path and should not be fixed against a wall where the solvent and grease will contaminate the wall surface.



3. No floor drain should be provided near the parts washer unit. Spills can be controlled on the floor surface and the solvent prevented from from entering the sanitary sewer, storm sewer or waste system.

PARTS CLEANING/PRESERVATION AREA



UTILITY SMALL PARTS HOIST (AS REQ'D FOR BAYS)

DI 18

PM-6
LATRINE/LOCKER ROOM

function/purpose	activities	personnel	equipment
Latrines, Showers, and Locker Rooms for Facility Personnel Use.	1. Washing. 2. Eliminating. 3. Self-grooming. 4. Personal storage.	All the personnel assigned to the facility; visitors.	1. Wash basins/soap holders. 2. Showers. 3. Urinals/water closets. 4. Mirrors. 5. Paper towel holders. 6. Lockers, benches. 7. Wastebaskets.
Personnel Training and Work Break Activities. A break, training, and conference area should be provided at a central location in the building where persons can assemble for daily work breaks and periodic group training sessions.	1. Training classes. 2. Breaks. 3. Conferences.	Could include all personnel working in the building, probably in groups of 20 percent of assigned maximum.	1. Tables with side chairs. 2. Vending machines. 3. Drinking fountain.

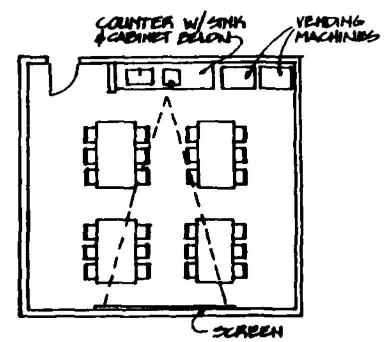
issues and assumptions

Toilet facilities shall be provided for men and women:

1. **Water consumption: In some locations, reducing water consumption is important. On military facilities, the installation of water-saving devices in latrines would reduce the amount of water that is used without affecting the operation of the equipment. This is especially important in geographic areas where water supplies are dwindling; in addition, it reduces water supply costs at all military installations.**

2. *Flexibility of Break, Training Facilities:*

Adequate space (area) for breaks, training, and/or conferences is required. Most facilities have fixed-wall construction on interior walls. Movable walls would allow flexibility in space allocation.

requirements	criteria	guidance
1. Illumination. 2. Power. 3. Plumbing fixtures. 4. Temperature. 5. Adequate ventilation. 6. Adequate size.	1. 250 lux. 2. 110V at least 24 in. above finished floor; (one 20A duplex/wall). 3. Provide water closets, urinals, and wash basins. Install water-saving devices in water closets, faucets, and showers. 4. 20^{o}C during winter. 5. 4 air changes per hour. 6. Space allocation. A minimum size should be determined and specified based on number	1. Use fluorescent fixtures for lighting. 2. Latrines should be centrally located and accessible from exterior and interior work areas. 3. Latrines should be provided in each inhabited building within a complex. 4. Latrines should be located in the parts of the building constructed as shop or office space. There are a number of different types of water-saving devices produced by commercial manufacturers that can be installed in water closets, faucets, and showers. 5. See OM-16 sheets for typical plan layouts.
1. Adequate size. 2. Smoking area ventilation (must be physically separated from vehicle bays). 3. Power. 4. Water sources for drinking fountain and coffee machines. 5. Illumination. 6. Communication. 7. AV screen.	1. A minimum size should be determined and specified based on number. 2. Ventilation - 10 air changes per hour. 3. Provide one 120V-20A duplex receptacle for each vending machine. Minimum of one on each wall. 4. - 5. 500-lux, fluorescent ceiling fixtures, with one fixture at rear of space switched separately for minimum light level for AV presentations. 6. One wall telephone. 7. 8-ft. x 8-ft. pulldown screen.	1. Example: A room 24 ft. x 24 ft. (or 575 sq. ft.) will provide adequate space for tables and chairs, plus some standing room or space for vending machines and adequate distance for AV presentations. 2. The use of second-floor space for office area, conference rooms, etc. would release area on the ground floor for other activities. 

DI 18

PM-7
EQUIPMENT STORAGE

function/purpose

Storing preservation maintenance equipment.

issues and assumptions

activities	personnel	equipment
1. Equipment storage.		

requirements	criteria	guidance
1. Adequate space.	1. 8 ft. x 10 ft. room with shelves.	
2. Power.	2. 110V or 220V service.	
3. Lighting.	3. 300 lux	
4. Security.	4. All storage should be lockable when unmanned.	

DI 18

PM-8

EXTERIOR: DEFUEL, ENGINE FOG, QA INSPECTION

function/purpose

POL removal, engine fog and quality assurance inspection prior to storage.

issues and assumptions

Storage calculations:

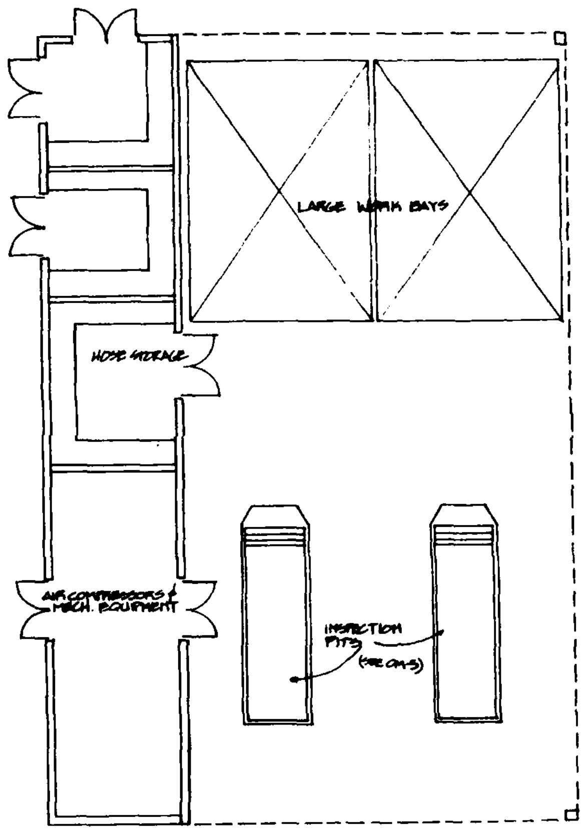
3 pads - 200m^2 each (12x17m) one near maintenance complex and the remaining two near CHWs.

Pads to have fuel separators in sump for spillage.

activities	personnel	equipment
1. Determine the equipment required for each vehicle. 2. Set up pumps and drain tank. 3. Fill tank with preservation oil and drain.	2 personnel	1. 2 - 50-gpm pumps ged electrically or pneumatically driven. Adapters for hoses to fit assorted fuel tanks. 2. 2 each - filtering unit hoses or pipes connecting pump to filter unit to tanks (see criteria for tank sizes). 3. 1 - 50-gpm pump.

requirements	criteria
1. 4 drive-through exterior bays.	1. Approximately 18 ft. x 24 ft. each.
2. POL storage tanks.	2. One underground 5000-gal. tank; one 1000-gal. above-ground diesel storage tank; one 600-gal. above-ground mogas storage tank; two 600-gal. tanks for contaminated fuel.
3. Shed to store hoses, adapters, and other material.	3. Approximately 12 ft. x 12 ft.
4. Tank for preservation oil.	4. 600-gal. tank above ground.
5. Power.	5. 110V, 220V, and 380V service if defueling pumps are electrically driven.
6. Floodlights for night operations.	6. General lighting 300 lux.
7. Petroleum pollution abatement.	7. Bays should be constructed of concrete with pumps to collect spillage. Complete area should be covered to minimize contamination by weather conditions.
8. Area security.	8. Access to all tanks must be lockable when unmanned.

guidance

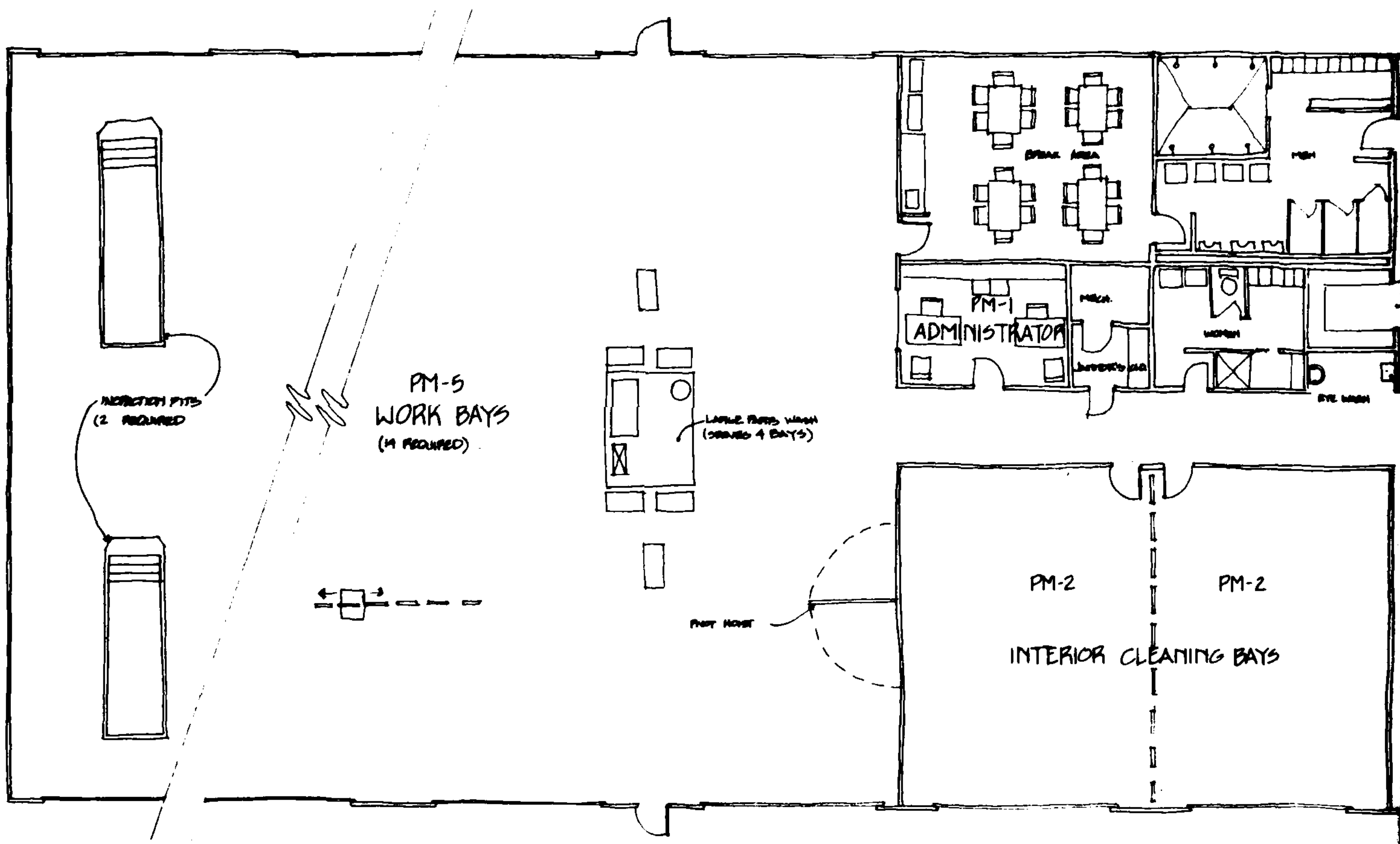


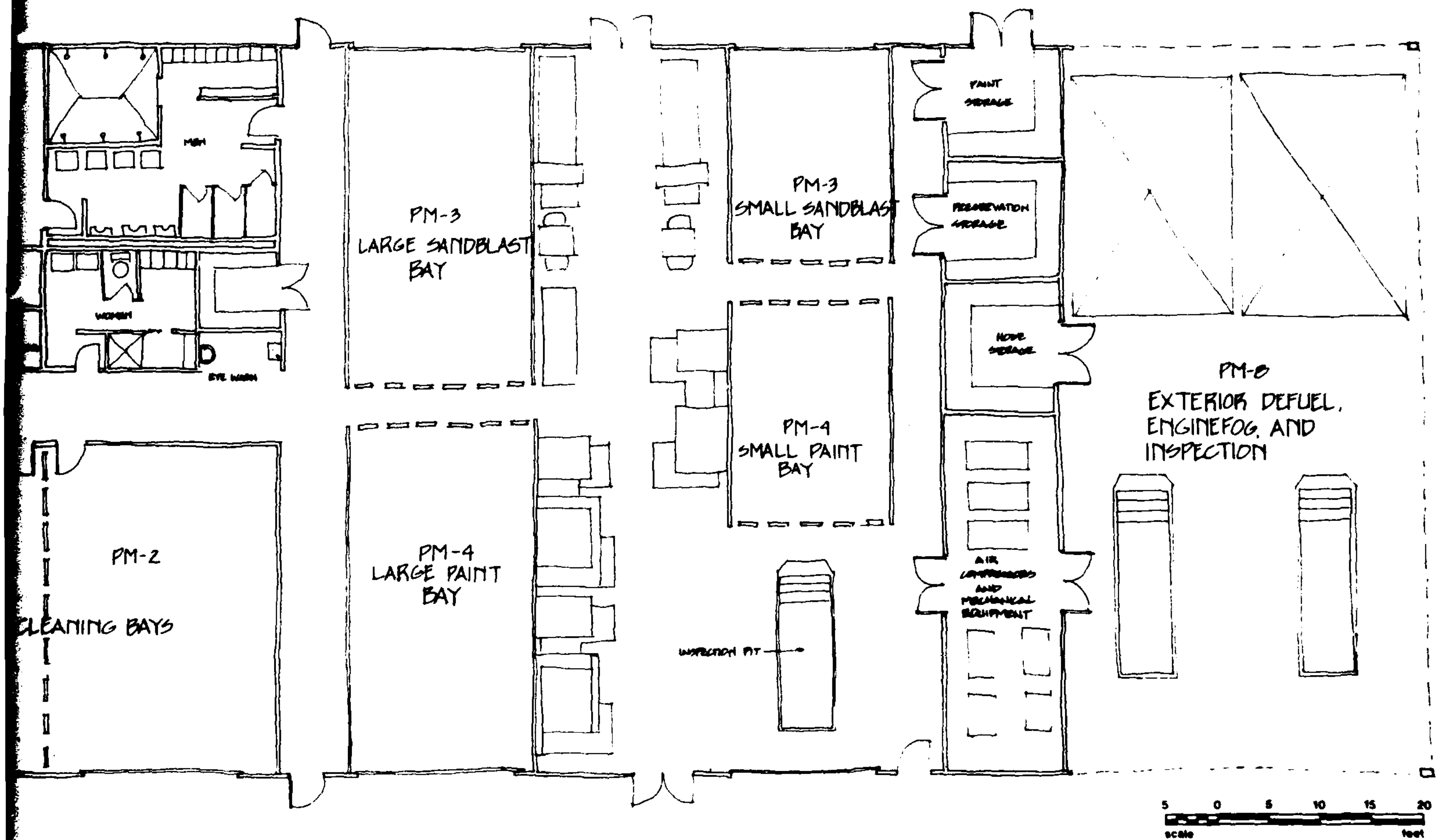
TYPICAL BAY LAYOUT
(COVERED OR ENCLOSED)

NOTES

Facility Layout Concept

Mechanical Preservation




PM-3
LARGE SANDBLAST BAY
PM-3
SMALL SANDBLAST BAY
PM-4
SMALL PAINT BAY
PM-8
EXTERIOR DEFUEL, ENGINEFOG, AND INSPECTION
PM-2
CLEANING BAYS
PM-4
LARGE PAINT BAY
5 0 5 10 15 20
scale
feet

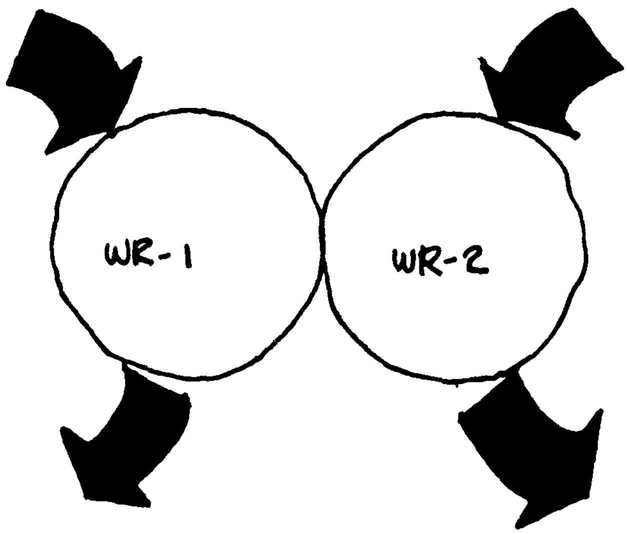
Wash/Grease Racks

Literature Information

Wash Racks and Grease Racks 19.2

User Information

WR-1 Tracked Vehicle Wash Platform 19.4
WR-2 Wheeled Vehicle Wash 19.6



PURPOSE

13.1 Covered wash racks and grease racks shall be PROVIDED so that vehicles and equipment returning from exercises can be cleaned before entering maintenance facilities or storage, and so that vehicles can be lubricated as part of normal cyclical maintenance procedures. (2)

ISSUES and ASSUMPTIONS

1. Examination and evaluation of existing structures (11):

   If existing buildings are being considered for reuse as POMCUS facilities, it is necessary to analyze the renovation costs against "new construction" costs. Major costs have been required to make existing buildings responsive to POMCUS activities, especially,

   1) adequate insulation for temperature controlled buildings,

   2) structural adequacy for lift capacities in maintenance facilities.

REQUIREMENTS

a) 13.2 A wash rack and grease rack facility shall be PROVIDED containing five wash rack bays and two grease rack bays. (2)

b) 13.3 Water for the wash racks will be recirculated. (2)

c) 13.3 Process steam for steam cleaning will be provided. (2)

d) 13.5 Effluent from the wash and grease rack area shall be passed through a PROVIDED POL separator before being allowed to pass into the sewer system. (2)

CRITERIA

a) 13.6 Grease racks will be elevated type and constructed of concrete or steel. Electricity shall be PROVIDED at each grease rack. (2)

a) 13.2 Aprons will be provided on two sides of the wash and grease racks to serve as connections to the respective access roads, so that it will be possible for vehicles washed to be driven straight into the maintenance or storage facilities(2)

b) 13.3 The settling basins, as well as the separator and pump equipment required for reprocessing the wash water, shall be PROVIDED. They will be located in a separate structure located next to the wash rack. Wash water will not be heated. (2)

c) 13.3 Steam generators PROVIDED and located at the wash rack. (2)

d) 1.2 Oil separators will have a net capacity of 2.50 liters for each square meter of surface to be drained. (2)

GUIDANCE

13.4 The floor of the wash rack will be concrete to prevent any solvents used in the cleaning process from attacking and deteriorating the material. (2)

DI 19

WR-1

TRACKED VEHICLE WASH PLATFORM

function/purpose

Washing Tracked Vehicles. Common SOP requires all tracked vehicles to be cleaned before maintenance work or placement in storage.

issues and assumptions

1. Common practice now requires that exterior, interior, and miscellaneous cleaning activities all occur on the washrack. The two major problems associated with this practice are:

a. Washing process uses large volumes of potable water and a great deal of manpower and time.

b. Process presently requires large volumes of polluting cleaning aids which must be removed from wastewater.

2. There are two acceptable alternatives:

a. Alternative 1: Centralizing all vehicle exterior cleaning at one or possibly two locations will result in:

(1) Reduced water usage.

(2) Minimized pollution control costs.

(3) Savings in manpower and energy.

b. Alternative 2: Creating a pre-soak area for tanks will result in:

(1) Reduced water usage.

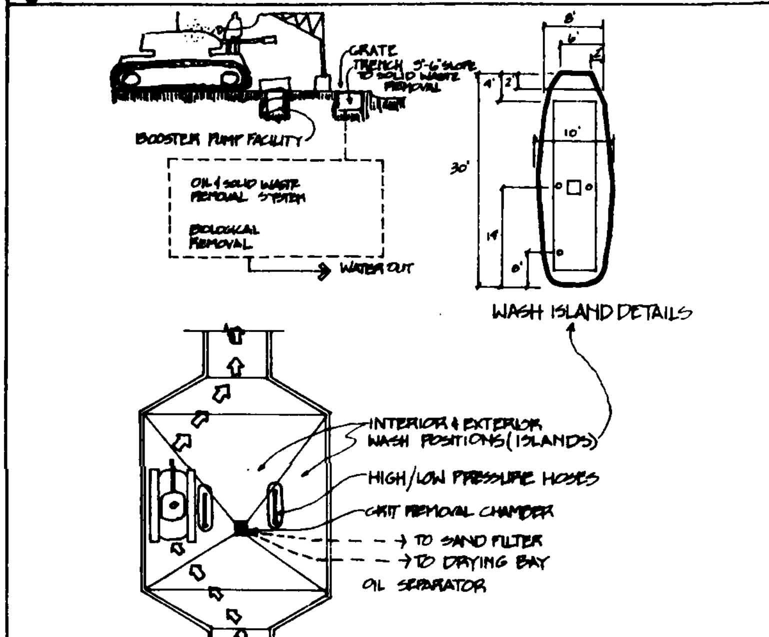
(2) Less time on wash stand.

(3) Less manpower for washing.

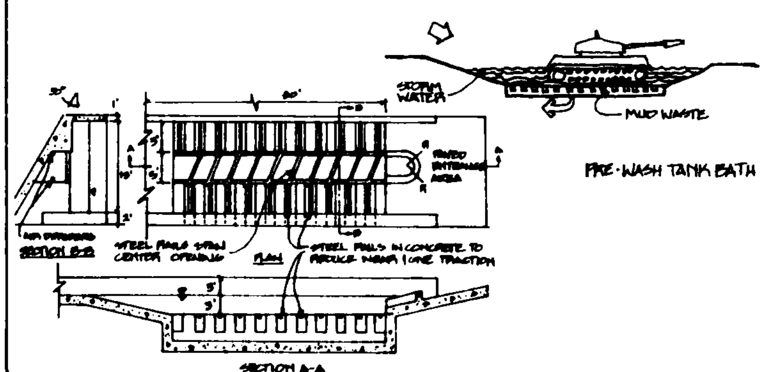
activities	personnel	equipment
1. Vehicle staging. 2. Vehicle pre-wash. 3a. Vehicle bath. 3b. Wash I. 4. Wash II. 5. Vehicle assembly.	1 1/2 man-hours est. max.	Washing Function Hoses and nozzles. Booster pumps. Lighting. Trash bins.
1. Drive tank through bath.		Storm water in concrete bath.

requirements	criteria
1. Non-potable water supply. 2. Hardstand. 3. Pump house. 4. Wastewater treatment systems. 5. Should be located next to tracked vehicle maintenance bays.	1. Pressure: 100 psi at nozzle. 1. Volume: 20 gal./min. (2 to 4 gal./min. for interior cleaning). 2. Reinforced concrete pad vehicle wash station, 30 ft. x 40 ft. min. 3. Flexible reinforced hose with nozzle. 4. - 5. -
1. Water containment area large enough to hold an M"X" tank and long enough for one rotation of track under water.	1. 30 ft. long. 12 ft. wide. Concrete 12-in. reinf. to support 40 tons distributed loading.

guidance



TYPICAL LAYOUT OF WASHSTAND FACILITY



PRE-WASH TANK BATH

WR-2
WHEELED VEHICLE WASH

function/purpose

Washing Tactical Wheeled Equipment. Common SOP requires that all tactical equipment be washed before maintenance work or placement in storage.

issues and assumptions

1. Wastewater treatment:

   a. Washing of wheeled tactical equipment uses high-volume, low-pressure washing equipment on washrack hardstands that are generally subject to stormwater intrusion. Cleaning engines, engine packs, etc., using detergents, solvents, diesel fuel and other agents in these areas further complicates the treatment of wastewaters.

   b. Centralizing all vehicle exterior cleaning at one location will result in:

   (1) Reduced water usage.

   (2) Minimized pollution control costs.

   (3) Savings in manpower and energy.

   (4) Lessening of unit integrity.

activities

1. Position vehicle in washrack.
2. Prepare vehicle by removing non-soluble debris.
3. Wet down vehicle.
4. Pick out mud from treads, etc.
5. Final wash of exterior.
6. Clean personnel compartment.
7. Wash down platform.

personnel

Wheeled vehicle operators.

equipment

1. Hoses with high-pressure nozzles.
2. Misc. cleaning tools.
3. Hand-held high-pressure, low-volume wash equipment for washing of jeeps, equipment that has broken down in the field, and certain engineer-wheeled construction equipment.
4. Low-pressure, low-volume, hand-held hoses at interior cleaning stalls.
5. Pumps to maintain water pressure at all stations simultaneously.
6. Oil/water separation unit.
7. Solid waste containers at all interior cleaning stalls.

requirements

1. Non-potable water supply.
2. Hardstand, paved area.
3. Hose delivery system.
4. Drainage trench.
5. Wastewater treatment system.

criteria

1. Pressure: 100 psi at nozzle.

   Volume: 20 gal./min. (2 to 4 gal./min. for interior cleaning).

2. Reinforced concrete pad, 30 ft. x 20 ft. min. vehicle wash station.

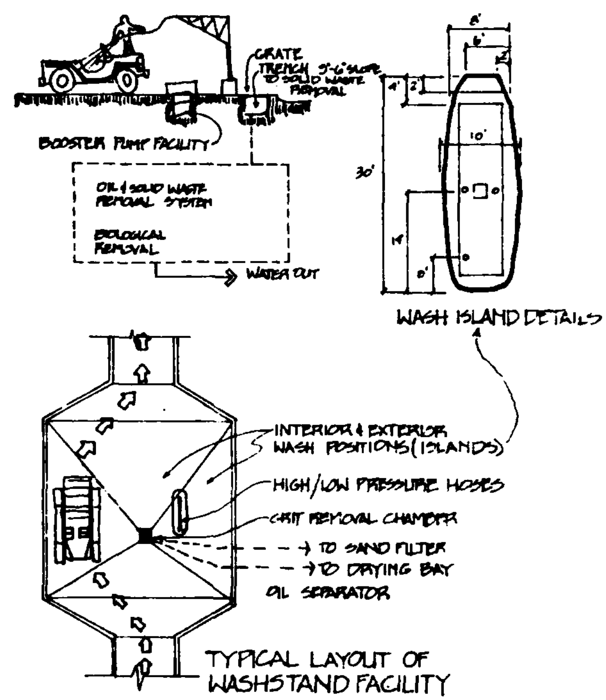
3a. One low-pressure, low-volume wash hose per vehicle for interior cleaning.

b. Two high-pressure, low-volume wash hoses per vehicle for all exterior wash bays.

4. 36 in. wide, 12 in. deep leading to oil separation unit.

5. -

guidance



TYPICAL LAYOUT OF WASHSTAND FACILITY

NOTES

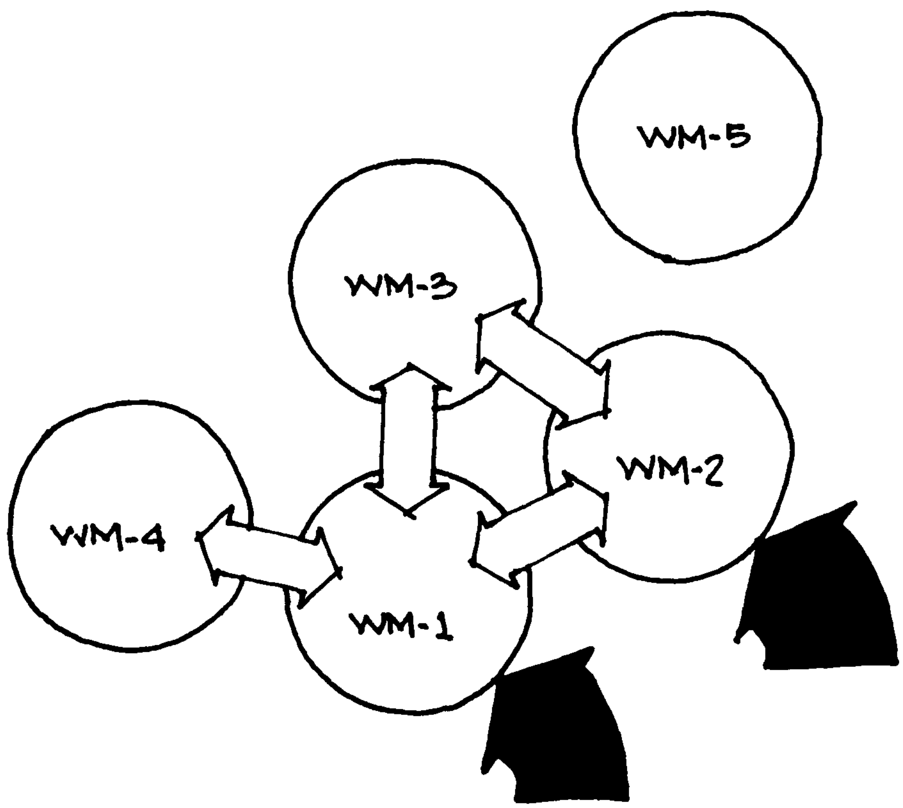
Weapons Maintenance and Security

Literature Information

Weapons Storage and Maintenance Facility 20.2
Controlled Humidity Warehouses 20.6

User Information

WM-1 Receiving/Issue 20.10
WM-2 Weapon Storage 20.12
WM-3 Weapon Maintenance 20.14
WM-4 Office/Inventory Control 20.16
WM-5 Break Area/Latrine 20.18
Facility Layout Concept



PURPOSE

6.1 A facility will be PROVIDED for periodic organizational and direct support maintenance checks on weapons.(2)

ISSUES and ASSUMPTIONS

a) 3.1 Covered space is preferred. When sufficient covered space for all items to be stored is not available, priority should be given to items which are most susceptible to deterioration from the elements. SB 38-8-1 should be used as a guide for establishing the items most susceptible to deterioration. (6)

b) 3.1 Open sites should be improved hardstand, if available. Unimproved sites should be firm, well-drained, and kept free of excessive vegetation.(6)

c) 2.5.7.2 Narrow aisle operating equipment will be used to maximum extent practicable to effect reduction in or minimizing of aisle widths. (3)

1. Examination and evaluation of existing structures (11):

   If existing buildings are being considered for reuse as POMCUS facilities it is necessary to analyze the renovation costs against "new construction" costs. Major costs have been required to make existing buildings responsive to POMCUS activities; especially,

   1) adequate insulation for temperature controlled buildings,

   2) structural adequacy for lift capacities in maintenance facilities.

REQUIREMENTS

a) 6.2 This facility consists of a reinforced masonry wall, reinforced or precast prefabricated concrete structure with specific areas designated for maintenance and administration, and an additional area for CH storage. (2)

b) 6.2 Dehumidification equipment shall be PROVIDED. (2)

c) 6.6 The structure shall contain latrine facilities, tool and parts storage, fire alarm, and automatic sprinkler system and smoke detection system. (2)

d) 3.5 The lighting system shall provide minimum illumination intensities as follows: (2)

e) 6.8 A monorail overhead conveyor system will be PROVIDED in the maintenance area and passing over the dip tanks to assist in moving the heavier weapons. (2)

f) 6.9 Mechanical ducting will be PROVIDED with sufficient security at walls to prevent any entry through or around it. (2)

CRITERIA

a) 6.2 Concrete or masonry walls and ceilings shall be at least 20 cm thick and reinforced concrete floor shall be at least 15 cm thick. (2)

d) 3.5.1 100 lux inside warehouses and storage building, measured at floor level.(2)

d) 3.5.2 250 lux inside of all maintenance, guard and administration facilities.(2)

e) 6.8 A 250 kg capacity is required. (2)

GUIDANCE

a) 6.2 Structure shall be concrete in order to adequately maintain the required level of security. (2)

b) 6.2 CH storage is necessary to minimize moisture related damage to weapons being stored. (2)

REQUIREMENTS

g) 6.10 Solvent and Preservative dip tanks will be PROVIDED and have a capability of being drained to PROVIDED underground storage tanks. (2)

h) 6.11 Structure shall contain an intercom and telephone communication system to other facilities.(2)

i) 6.3 A triple security barrier of fence and double doors shall be PROVIDED at both entranceways. (2)

j) 6.4 In order to maintain adequate security, an Intrusion Detection Alarm (IDA) Security System will be PROVIDED.

k) 6.4.1 The structure shall be protected by different types of sensors designed to detect any intrusion. Two types of sensors with different methods of activation will be installed:

CRITERIA

g) 6.10 Underground storage tanks will have a capacity of 400 liters.

k) 6.4.1.1 Balanced magnetic switches (all security doors) (2)

k) 6.4.1.1 Motion detectors (storage area) (2)

k) 6.4.2 Type of System: The intrusion-detection system shall be of the type designed to transmit signals automatically over electrically supervised lines from detectors and other alarm initiating devices installed on protected spaces and objects. Radio frequency data transmission is not acceptable. (2)

GUIDANCE

REQUIREMENTS

l) 6.5 A security fence as defined earlier for Class V areas will be PROVIDED around this structure along with security lighting mounted on the exterior of the structure (2)

m) 2.5.7.3 As a means of contributing to storage regularity and also to provide a desirable safety factor, warehouse aisle boundaries will be clearly identified by painted stripes. (3)

CRITERIA

l) 3.5.3 5 lux outside of all storage and administrative buildings at midpoint of lower edge of each door only, around the perimeter of open storage areas for routine security and personnel safety purposes, at entrances through the fence and around Class V storage. (2)

m) 2.5.7.3 The width of these stripes will not exceed 4 inches nor be reduced below 3 inches, and will be consistent throughout an installation's warehouses. White Gloss No. 17875, as identified in Federal Standard TT-C-595, and as required by AR 385-30 will be used for this purpose. Paint will conform to Federal Specification TT-P-115, Paint, Traffic, Highway. (3)

GUIDANCE

PURPOSE

ISSUES and ASSUMPTIONS

1.2

For those materials and supplies which may deteriorate or be damaged if stocked in the open, roofed open storage or controlled humidity storage will be PROVIDED. (2)

3.10.2.1 In high humidity environment, conventional storage facilities do not afford adequate protection to certain types of supplies preserved Level C against damage and deterioration that can result from excessive humidity. This is particularly applicable where supplies are to remain in storage for extended periods. To insure that the capability of material to perform its intended function will not be impaired or that supplies will not become unfit for consumption as a result of exposure to excessive humidity, methods have been developed to provide control of humidity within storage warehouses. (7)

3.10.7.10.2 Where battery-powered equipment cannot be or is impracticable to obtain or use in controlled humidity storage, gasoline-engine-powered equipment can be used with certain precautions. In use of such equipment, certain factors must be considered. (7)

3.10.7.10.2.2 When utilizing engine-driven materials handling equipment in controlled humidity warehouses, any concentration of carbon monoxide gas which exceeds 100 parts of carbon monoxide per 1,000,000 parts of air must be prevented. (7)

3.10.3.3 The modern, permanent warehouses (WW II and later) are preferred for the storage of current distribution stocks. These warehouses will be converted to controlled humidity space (by section or complete warehouse) as required and permitted by available funds. (7)

3.10.3.5 Sections of warehouses used exclusively for shipping, receiving, and box shop operations normally will not be converted to controlled humidity space. (7)

3.10.3.6 Considering cost of installation and continuing cost of operation, controlled humidity space can be installed most economically in permanent and standard portable frame warehouses, such as: (7)

3.10.3.6.1 Permanent-type standard warehouses constructed since 1950, 200'X 1000', built-up roof, concrete roof decking with steel framing or laminated wood roof framing, block or brick side walls and dock level floors. (7)

3.10.3.6.2 Permanent-type warehouses, gabled roof with steel framing; block or tile walls, windows, and louvers. (7)

3.10.3.6.3 Permanent type warehouses constructed between 1940 and 1950, 180'x1440' (or multiples of 240' sections), with monitor in center third of roof, block or brick side walls, and dock level floor. (7)

AD-A093 672 CONSTRUCTION ENGINEERING RESEARCH LAB (ARMY) CHAMPAIGN IL F/G 15/5
TYPE II FORWARD STORAGE SITE FACILITIES: POMCUS SYSTEM. VOLUME --ETC(U)
SEP 80 R L PORTER
UNCLASSIFIED CERL-TR-P-112-VOL-2 NL

4 of 6
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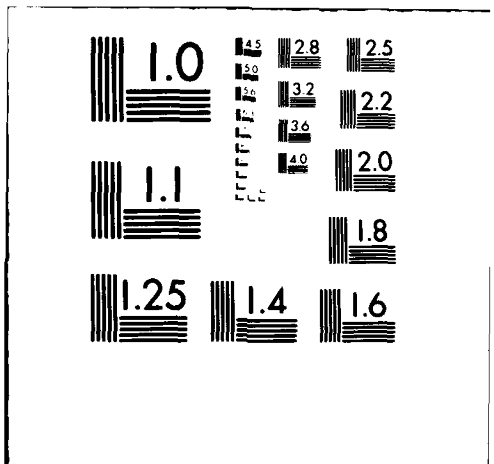


MICROCOPY RESOLUTION TEST CHART

ISSUES and ASSUMPTIONS

1. Examination and evaluation of existing structures (11):

   If existing buildings are being considered for reuse as POMCUS facilities it is necessary to analyse the renovation costs against "new construction" costs. Major costs have been required to make existing buildings responsive to POMCUS activities; especially,

   1) control of humid air infiltration into CHW at existing openings,

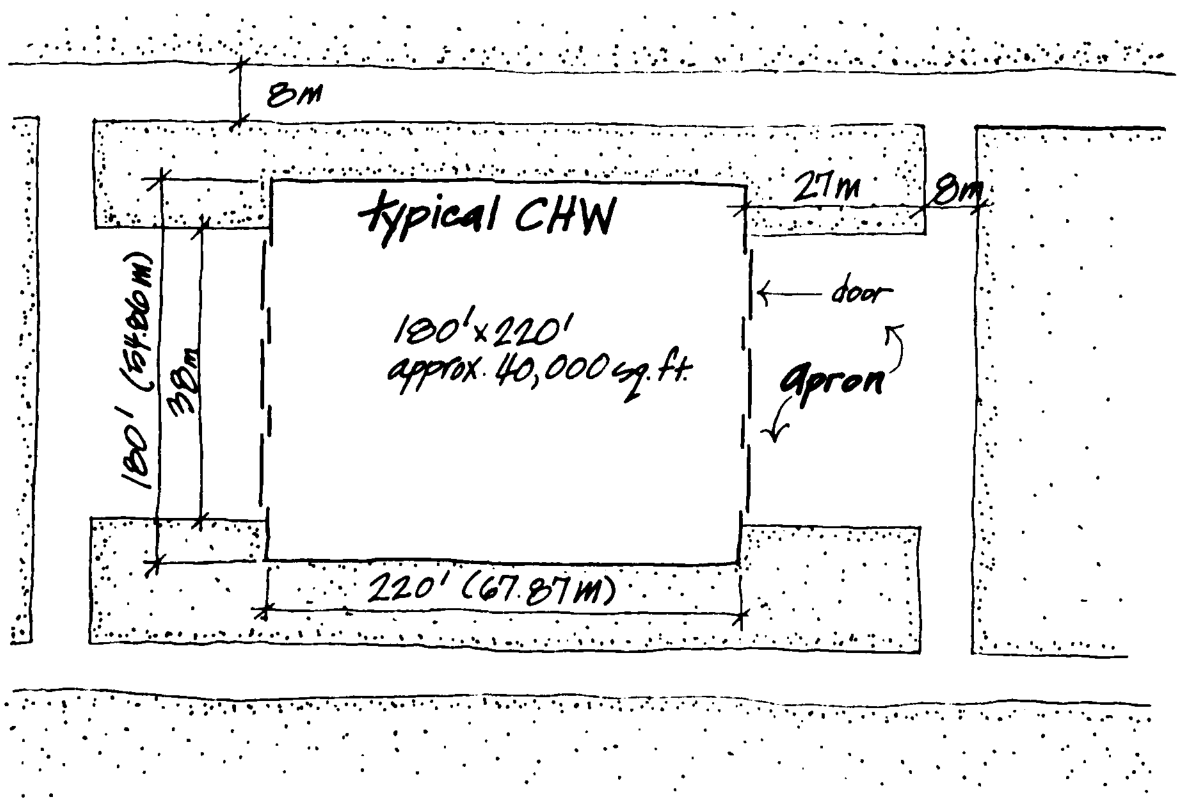
   2) adequate insulation for temperature controlled buildings,

   Roads per CHW: 500m x 8m = 4000m^2

   Turn pads per CHW: 1@ 10m x 20m = 200m^2

   Aprons (2 per CHW): 1=38m x 27m = 1026m^2 each
   or 2052m^2 per CHW

   Total per CHW = 6252 m^2



REQUIREMENTS

a. 4.2.1 CHS warehouses will be of semi-permanent type construction providing the controlled humidity storage requirement can be met. (2)

b. 4.2.1 An annex to each warehouse will be PROVIDED to house dehumidifying equipment. Necessary dehumidifier units will be PROVIDED. (2)

c. 3.10.3.1 Controlled humidity storage space should be provided for areas where the outdoor relative humidity is 40 percent or above for more than 50 percent of the total time. (7)

d. 3.10.7.1 Controlled humidity equipment should be located within the warehouse so as not to obstruct traffic aisles. (7)

e. 3.10.7.2 It is essential that the entrance of humid air into controlled humidity warehouses be kept to the minimum in order to maintain the relative humidity at desired level. Door control is of paramount importance, since the greatest source of moisture penetration is through open doors. An alarm system may be provided to signal open doors. (7)

CRITERIA

a. 3.10.3.2 Equipment for the control of humidity in storage space will be operated so as to maintain 40 percent relative humidity (RH). (3)

GUIDANCE

1.2
For all CHS warehouses and other buildings, austere construction will be employed as far as possible. Austere construction means light prefabricated metal, cement, or cinder block or other low cost nonflammable construction, which will insure sufficient protection against climatic conditions of the site. (2)

NOTES

DI 20

WM-1
RECEIVING/ISSUE

function/purpose

To receive, uncrate, and transfer hand receipts for all unit weapons, initially from main shipping and receiving facility and then at REFORGER turn-in.

issues and assumptions

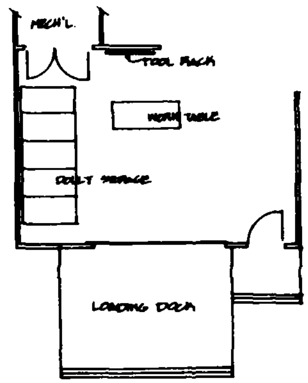
Crew Served Weapons

These consist of machine guns (7.62mm coaxial and .50 caliber ground and vehicle mounted) and mortars (81mm and 4.2"). Such weapons are found in all maneuver battalions, and some in support and service support units. Weapons are received in wooden crates, with spare machine gun barrels packed in heavy cardboard tubes. At CEC's weapons are unpacked, maintained, preserved, and stored on metal shelves, segregated by UIC and type. The arms rooms used for storage meet the requirements of AR190-11 with USAREUR Supplement 1 thereto.

activities	personnel	equipment
1. Uncrate. 2. Inspect. 3. Clean surfaces. 4. Place on pallets for moving into storage.	3 - staff share all activities: MOS-45Z MOS-45B MOS-45K.	1. Table (30 in. x 84 in.). 2. Tool rack (48 in. x 96 in.) on wall. 3. Dolly storage for 5 (30 in. x 60 in. each).

requirements	criteria
1. Adequate area.	1. Open work space - approximately 350 sq. ft.
2. Environmental control.	2. 20°C during winter.
3. Illumination.	3. 400 lux.
4. Access.	4. Main opening to loading dock (3 ft., 10 in. high).
5. Loading dock area.	5. Approximately 15 ft. x 10 ft. deep.
6. Power.	6. 110V outlets 15 ft. o.c.

guidance



DI 20

WM-2 WEAPON STORAGE

function/purpose

To store in a secure manner all unit weapons, so that periodic inventories and mobilization issue can be performed efficiently.

issues and assumptions

1. Weapons handling:

   Currently, each weapon element is handled separately when moved into and out of storage. Pallets are required that fit both the storage rack frame and a movable dolly, so that the five or six units can be moved simultaneously. The pallet would also contain a card slot so that identification numbers can be placed by each weapon element for rapid inventory.

2. Storage Calculations:

   There are two configurations of this building. One is with a 4000 SF storage area (372m2) and the other with a 6000 SF storage area (558m2). Additionally, each structure has a 248m2 fpr, maintenance and 24m2 administrative area.

   This facility is authorized a separate fence surrounding the structure.

activities

1. Move into storage area.
2. Periodic inventory.
3. Issue in unit sets during REFORGER or mobilization.

personnel

3 are typical (more during issue).

equipment

1. Weapon racks (see Guidance) for pallets.
2. Dollies (30 in. x 60 in.) for pallets.

requirements

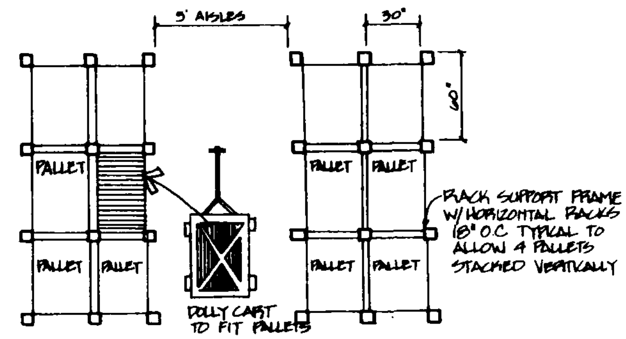
1. Adequate size.
2. Environmental control.
3. Illumination.
4. Access.
5. Security Fence.

criteria

1. Approximately 2400 sq. ft., based on weapons stored.
2. $20^{0}C$ during winter.
3. 250 lux at aisles.
4. Openings into receiving area and maintenance area. All other openings are of restricted size to prevent unauthorized entry.
5. FENCES FOR PHYSICAL SECURITY:

   ISAE has received information from the USAREUR Provost Marshal office that forthcoming physical security guidance will state that ammunition and explosive storage sites will require a minimum fence heigh of six feet and that a topping of a single outrigger with three strands of barbed wire will be required, facing out. If weapons and ammunition are jointly stored, as in an upload area, then a minimum fence height of six feet is required and a topping requirement of two 18-inch long outriggers, with three strands of barbed wire on the outer outrigger and a reinforcing wire on the inner outrigger, will be installed at 45 degrees to form a "Y", with a roll of 24/30 inch diameter barbed tape placed between the "Y" outriggers and barbed wire. (AEUES-CN-M/2136-6263)

guidance



TYPICAL RACK SPACING
(FOR 30x60in DOLLY)

DI 20

WM-3
WEAPON MAINTENANCE

function/purpose

To provide initial and periodic maintenance for weapon elements, especially after REFORGER exercises.

issues and assumptions

activities

1. Inspect.
2. Clean.
3. Adjust.
4. Calibrate.

personnel

3 personnel

equipment

1. Tool board (on wall) - 48 in. x 96 in.
2. Parts cabinet (36 in. x 48 in.).
3. Open shelving above workbenches - 30 lin. ft.
4. Solvent cleaning tanks.
5. Monorail handling system.
6. 2 sinks.
7. 48 lin. ft. x 3 ft. Dp worktable.

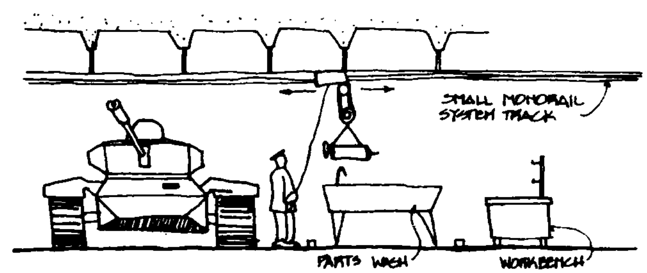
requirements

1. Adequate area.
2. Hoist rail interconnecting solvent cleaning tanks and workbenches.
3. Illumination.
4. Environmental control.
5. Power.

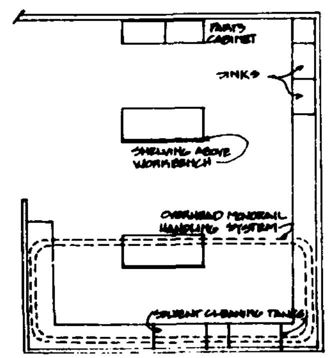
criteria

1. Approximately 750 sq. ft.
2. 250-kg. capacity.
3. 400 lux at workbenches.
4. 20°C during winter.
5. 110V outlets - 4 ft. o.c. at bench height.

guidance



TYPICAL SECTION (THRU WORK AREA)



DI 20

WM-4
OFFICE/INVENTORY CONTROL

function/purpose

To supervise maintenance operations and maintain inventory records of all weapon units.

issues and assumptions

activities

1. Staff supervision and instruction.
2. Inventory recordkeeping.

personnel

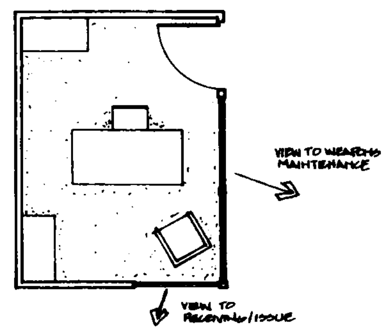
1 person

equipment

1. Desk (30 in. x 60 in.) with chair.
2. 1 side chair.
3. 30 lin. ft. of bookshelves.
4. Locked cabinet (36 in. x 48 in.).
5. Tackboard (60 in. x 48 in.).

requirements	criteria
1. Adequate space.	1. Approximately 125 sq. ft.
2. Illumination.	2. 500 lux, fluorescent fixtures.
3. Power.	3. A minimum of one duplex, 110V outlet per wall.
4. Communication.	4. Telephone.
5. Environmental control.	5. $20^{\circ}C$ during winter.

guidance



DI 20

WM-5
BREAK AREA/LATRINE

function/purpose

Latrines, Showers, and Locker Rooms for Facility Personnel Use.

Personnel Training and Work Break Activities. A break, training, and conference area should be provided at a central location in the building where persons can assemble for daily work breaks and periodic group training sessions.

issues and assumptions

Toilet facilities shall be provided for men and women:

1. Water consumption: In some locations, reducing water consumption is important. On military facilities, the installation of water-saving devices in latrines would reduce the amount of water that is used without affecting the operation of the equipment. This is especially important in geographic areas where water supplies are dwindling; in addition, it reduces water supply costs at all military installations.

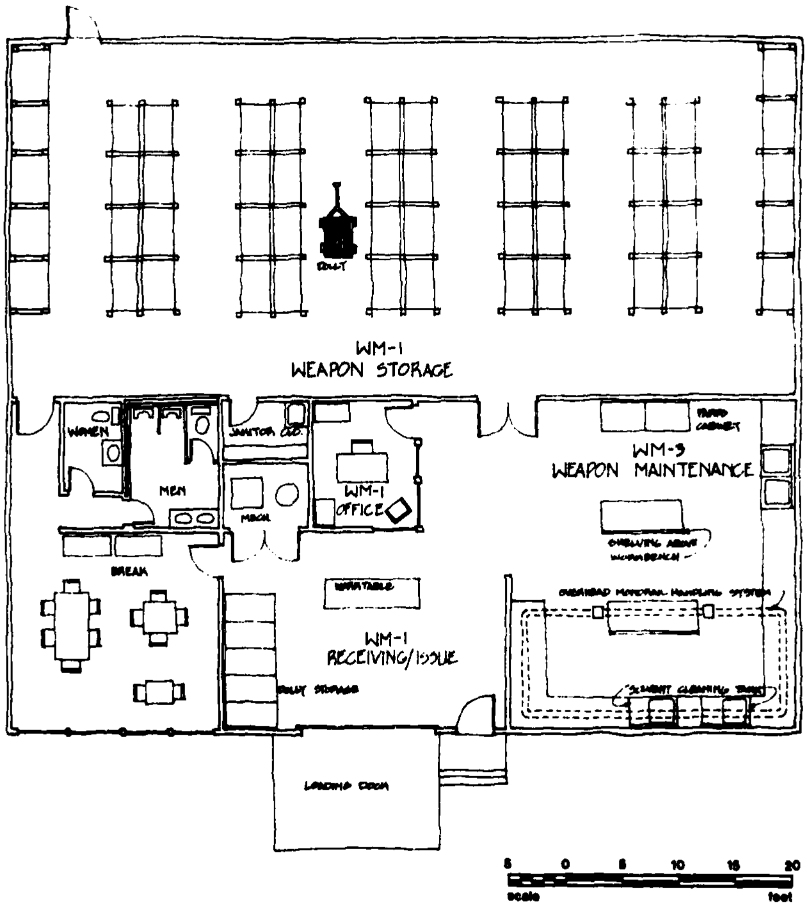
2. Flexibility of Break, Training Facilities:

Adequate space (area) for breaks, training, and/or conferences is required. Most facilities have fixed-wall construction on interior walls. Movable walls would allow flexibility in space allocation.

activities	personnel	equipment
1. Washing. 2. Eliminating. 3. Self-grooming. 4. Personal storage.	All the personnel assigned to the facility; visitors.	1. Wash basins/soap holders. 2. Showers. 3. Urinals/water closets. 4. Mirrors. 5. Paper towel holders. 6. Lockers, benches. 7. Wastebaskets.
1. Training classes. 2. Breaks. 3. Conferences.	Could include all personnel working in the building, probably in groups of 20 percent of assigned maximum.	1. Tables with side chairs. 2. Vending machines. 3. Drinking fountain.

requirements	criteria	guidance
1. Illumination. 2. Power. 3. Plumbing fixtures. 4. Temperature. 5. Adequate ventilation. 6. Adequate size.	1. 250 lux. 2. 110V at least 24 in. above finished floor; (one 20A duplex/wall). 3. Provide water closets, urinals, and wash basins. Install water-saving devices in water closets, faucets, and showers. 4. $20^{0}C$ during winter. 5. 4 air changes per hour. 6. Space allocation. A minimum size should be determined and specified based on number.	1. Use fluorescent fixtures for lighting. 2. Latrines should be centrally located and accessible from exterior and interior work areas. 3. Latrines should be provided in each inhabited building within a complex. 4. Latrines should be located in the parts of the building constructed as shop or office space. There are a number of different types of water-saving devices produced by commercial manufacturers that can be installed in water closets, faucets, and showers. 5. See OM-16 sheets for typical plan layouts.
1. Adequate size. 2. Smoking area ventilation (must be physically separated from vehicle bays). 3. Power. 4. Water sources for drinking fountain and coffee machines. 5. Illumination. 6. Communication. 7. AV screen.	1. A minimum size should be determined and specified. 2. Ventilation - 10 air changes per hour. 3. Provide one 120V-20A duplex receptacle for each vending machine. Minimum of one on each wall. 4. — 5. 500-lux, fluorescent ceiling fixtures, with one fixture at rear of space switched separately for minimum light level for AV presentations. 6. One wall telephone. 7. 8-ft. x 8-ft. pulldown screen.	

NOTES



WM-1
WEAPON STORAGE
WOMEN
MEN
JANITOR CLO.
MECH.
WM-1
OFFICE
WM-3
WEAPON MAINTENANCE
BREAK
WM-1
RECEIVING/ISSUE
5 0 5 10 15 20
scale
feet

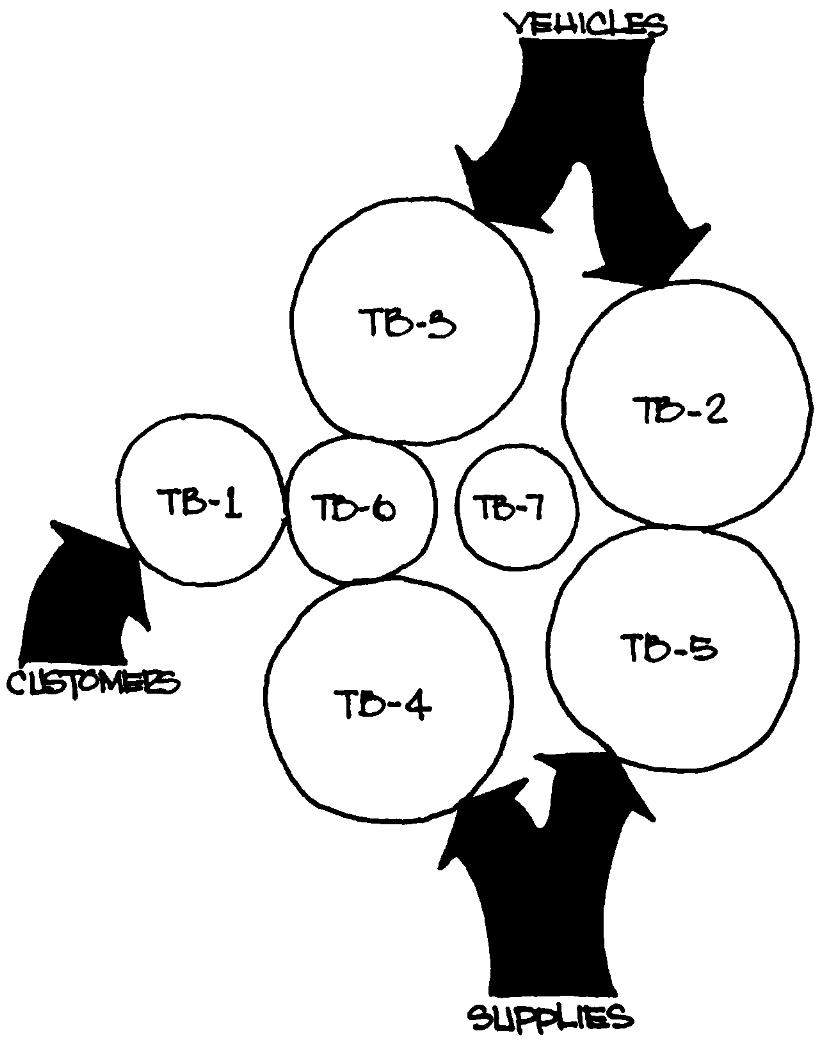
Literature Information

Work Shop Facility 21.2

User Information

WS-1 Trade Shops Administrative Offices 21.6
WS-2 Machine/Body Shop 21.8
WS-3 Vehicle Radiator Shop 21.10
WS-4 Wood Shop 21.12
WS-5 Glass/Canvas Shop 21.14
WS-6 Break Area/Latrine/Locker 21.16
WS-7 Maintenance Supply Storage 21.18

Facility Layout Concept



PURPOSE

ISSUES and ASSUMPTIONS

a) 8.1 This facility will be PROVIDED to accommodate the following activities required as part of the DS Maintenance capabilities. (2)

b) 8.1.1 A Glass Repair Shop, including work and storage areas, with forklift access. (2)

c) 8.1.2 A Canvas Repair Shop, including three, 1-ton capacity overhead cranes, sufficient storage space for serviceable and unserviceable canvas, and doors which will allow forklift access. (2)

d) 8.1.3 A Machine Shop, radiator shop and a woodwork shop, including work and storage areas with forklift access. (2)

e) 8.1.5 A Component Overhaul Shop including work and storage areas for the rebuilding and overhaul of brake shoes, wheel cylinders, starters, alternators, generators, heaters and carburetors. (2)

f) 8.1.4 A Parts Storage area including interior storage and exterior covered (3 walls and a roof for sunlight sensitive items, such as tires) and uncovered storage; all designed for forklift/pallet operations with storage racks and bins. (2)

g) 5.2 If the primary water supply required to satisfy the above demand is inadequate, or is not available, ground level storage points or open tanks will be PROVIDED. (2)

1. Examination and evaluation of existing structures (11):

   If existing buildings are being considered for reuse as POMCUS facilities it is necessary to analyze the renovation costs against "new construction" costs. Major costs have been required to make existing buildings responsive to POMCUS activities; especially,

   1) adequate insulation for temperature controlled buildings,

   2) structural adequacy for lift capacities in maintenance facilities.

REQUIREMENTS

a) 8.2 Compressed air and water supply shall be PROVIDED by outlets in all the above shop and storage areas. (2)

b) 8.3 A fence shall be PROVIDED around the exterior storage area to protect against pilferage. (2)

c) 8.3 Latrines shall be PROVIDED. (2)

d) 5.1.2 DOMESTIC USAGE. A water distribution system for domestic and industrial usage will be PROVIDED ensuring an adequate rate of flow to all guard and administrative building, and to maintenance facilities. (2)

e) 1.2 Oil separators will be PROVIDED on floor drains from all vehicle areas. (2)

f) 1.4 Offices and shops not having natural ventilation will have mechanical ventilation. (2)

g) 3.5 The lighting system shall provide minimum illumination intensities as follows: (2)

CRITERIA

e) 1.2 Oil separators will have a net capacity of 2.50 liters for each square meter of surface to be drained. (2)

f) 1.4 Mechanical ventilation will provide 10 air changes per hour, unless otherwise noted. (2)

g) 3.5.2 250 lux inside of all maintenance, guard and administration facilities. (2)

GUIDANCE

REQUIREMENTS

h) 3.4 All maintenance, storage, guard buildings and entrances to the site perimeter fence will be PROVIDED with lighting controlled by local switching. (2)

i) 3.5.5 Area lighting will be provided on all buildings, loading ramps, washracks, grease racks, IFBS areas, exterior storage and work areas for night operations. (2)

j) 7.5.1 Illuminated access aprons, one per door of magazines and bunkers, and all storage buildings (Class V utilizes interlocking concrete block), as well as illuminated concrete aprons (tracked vehicles) around the Vehicle-Maintenance Facility, Trades Building, Wash Racks, Grease Racks, POL Storage and Pump Station, Mech Preservation Facility, and Non Mech Maintenance Facility shall be of sufficient size to permit turning and backing of larger vehicles. (2)

CRITERIA

j) 7.5.2 All aprons will be constructed of rigid pavement, except around Class V magazines and bunkers as noted above. (2)

GUIDANCE

NOTES

DI 21

WS-1

TRADE SHOPS ADMINISTRATIVE OFFICES

function/purpose

To administer the Allied Trades Shops for wood, glass, canvas, and for vehicle, radiator, and body repair.

issues and assumptions

1. Scope of trades building operations:

Allied Trades Office Admin.

Canvas + Glass	Machine Shop	Radiator Repair	Carpenter Shop

a. The future CEGE sites will be required to do Direct Support maintenance.

b. Functions not presently accomplished at a current site which must be accomplished on-site are:

(1) Glass and canvas repair.

(2) Radiator repair.

(3) Machinist work.

(4) Carpentry work.

(5) Increased repair parts storage.

c. Adjacent hardstand facilities must be built to accommodate the exterior storage for the above requirements.

(1) 280m^2 covered (roof only) storage.

(2) 280m^2 open storage.

activities

1. To administer the trades shop operations.
2. To maintain production records of shop operations.

personnel

3 - LNs.

equipment

1. 3 desks (30 in. x 60 in.) with chairs.
2. 4 bookcases (48 in. x 15 in.).
3. File (15 in. x 28 in.).
4. Customer counter (72 in. x 30 in.)
5. Waiting seating for 5 near counter.

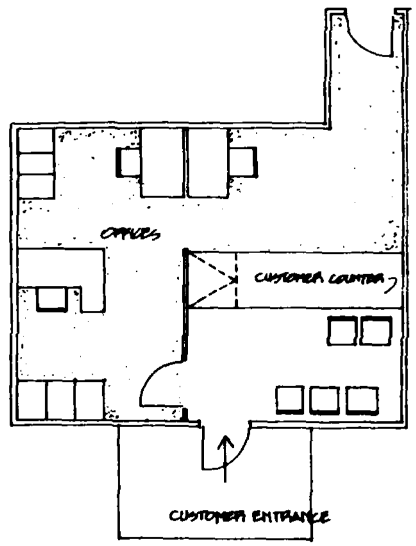
requirements

1. Adequate space.
2. Power.
3. Lighting.
4. Heating, cooling, ventilation.
5. Communication.

criteria

1. 80 to 90 sq. ft. per person with additional space for equipment and files.
2. 110V duplex outlets at each 10 ft. *of wall.*
3. 500 lux with fluorescent fixtures.
4. 20°C.
5. Coordinate telephone and intercom needs with the installation.

guidance



DI 21

WS-2 MACHINE/BODY SHOP

function/purpose

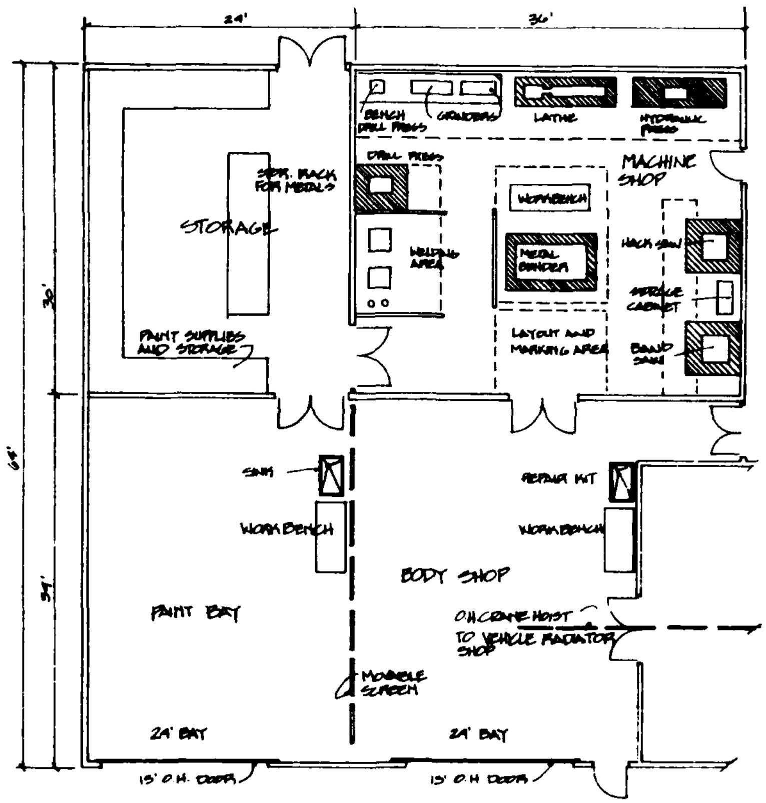
To perform all metal work for equipment and vehicle maintenance at the Direct Support level.

issues and assumptions

activities	personnel	equipment
1. Welding and fabrication of special parts and tools as required for support mission.	1 - machinist. 1 - machinist assistant. 1 - welder. 1 - welder helper.	1. Lathe (3 ft. x 8 ft.). 2. Drill press (3 ft. x 3 ft.). 3. Hydraulic press, minimum 10 ton (4 ft. x 7 ft.). 4. Grinder/portable and fixed (1 ft. x 1 ft.). 5. Vise on work table (3 ft. x 6 ft. x 4 ft. high). 6. Storage cabinet (2 ft. x 3 ft. x 5 ft.). 7. Metal bender (10 ft. x 4 ft.). 8. Endless hacksaw (3 ft. x 3 ft.). 9. Band saw (3 ft. x 3 ft.). 10. 300-amp welder (1 ft. x 2 ft.). 11. Inert gas welder (1 ft. x 2 ft.). 12. Storage area will have racks for working metal stocks.
2. Repair of damage to domestic vehicles, such as fender repair, etc.	2 - body and fender repairmen. 1 - assistant. 1 - painter.	1 - work table (84 in. x 36 in.). 1 - sheet metal repair kit. 2 - storage cabinets (48 in. x 24 in. x 72 in. high).

requirements	criteria
1. Adequate area. 2. Power. 3. Illumination. 4. Environmental control. 5. Communications.	1. Machine Shop 1000 Sq Ft. Storage 600-700 Sq. Ft. 2. 110V service. 3. 400 lux - fluorescent. 4. 20°C during winter; ventilation -- 10 air changes per hour. 5. Telephone intercom to shop
1. Adequate area. 2. Power. 3. Illumination. 4. Environmental control. 5. Communications.	1. Two 24 ft. x 32 ft. bays. 2. 110V service power. 3. 400 lux with fluorescent fixtures. 4. 20°C. 5. Coordinate telephone and intercom needs with the installation.

guidance



DI 21

WS-3
VEHICLE RADIATOR SHOP

function/purpose

To repair vehicle radiators and other plumbing systems at the site.

issues and assumptions

1. Radiator Repair:

   Currently provided by DS units off-site; will later be provided on-site.

activities

1. Repair radiators.
2. Repair all other plumbing required to support the mission.

personnel

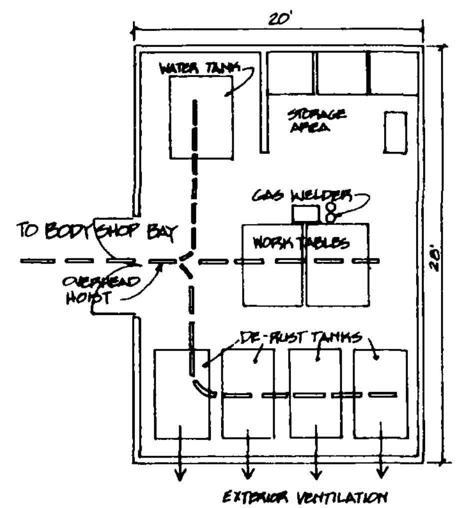
2 - LNs.

equipment

1. Water tank assembly, (6 ft. x 5 ft. x 4 ft.).
2. Two work tables (6 ft. x 4 ft. x 4 ft. high).
3. Gas welder/brazing, soldering (1 ft. x 2 ft.).
4. Storage area equipment cabinet (3 ft. x 5 ft. x 5 ft.).
5. Pallets for radiators (4 ft. x 4 ft.).
6. Derust area equipment vats -- 4 each, 6 ft. x 6 ft. x 4 ft. (requires drainage) and environmental protection.
7. Overhead crane with rail assembly over racks.

requirements	criteria
1. Adequate area.	1. Work Area - 200 sq. ft.; storage area 70 sq. ft.; derust area - 130 sq. ft.; water tank - 60 sq. ft. total area = 560 sq. ft.
2. Air supply.	2. Compresseo air to work tables.
3. Water.	3. Cold water supply to tanks.
4. Illumination.	4. 300 lux.
5. Power.	5. 100V/220V to equipment; 110V duplex outlets at work tables.
6. Heating/ventilation.	6. $20^{o}C$ during winter, with 10 air changes per hour.

guidance



DI 21

WS-4 WOOD SHOP

function/purpose

To repair all wood and wood-related items.

issues and assumptions

activities

1. Repair forms, sideracks, trailer beds.
2. Construct storage racks, shelves, crates, and boxes.

personnel

2 - LNs.

equipment

1. Band saw (3 ft. x 3 ft.).
2. Radial arm saw (4 ft. x 8 ft.).
3. 2 storage cabinets (48 in. x 24 in. x 72 in. high).
4. Impact wrench (3 ft. x 3 ft.).
5. Drill press (3 ft. x 3 ft.).
6. Electric drill (2 ft. x 3 ft.).
7. 2 work tables (4 ft. x 8 ft.).
8. Table saw (4 ft. x 4 ft.).
9. Table sander (2 ft. x 5 ft.).
10. Planer/joiner (2 ft. x 5 ft.).
11. Forklift (small).

requirements

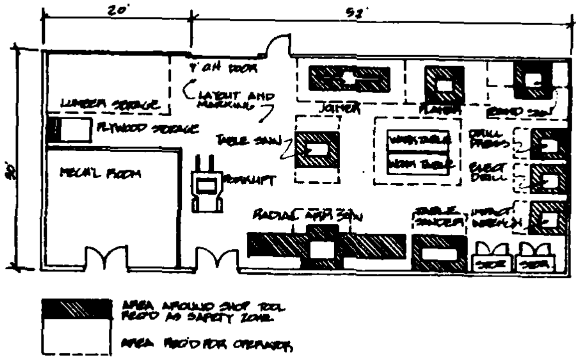
1. Adequate area.
2. Access for wood movement by fork-lift.
3. Illumination.
4. Heating/ventilation.
5. Equipment exhaust system.

criteria

1. Work area: 1600
   storage area: 200-300
2. Doors for material:
   a. Exterior to storage - 8 ft. x 10 ft. high.
   b. Storage to work area - 8 ft. x 10 ft. high.
3. 300 lux in work area, with task lighting at equipment and work tables; 100 lux in storage area.
4. 20°C during winter, with 10 air changes per hour.
5. Central direct connecting all saws, sanders, and jointers.

guidance

1. Direct access to exterior receiving area for wood as plywood sheets and 15-ft.-long lumber.
2. Storage area must be large enough to store plywood sheets that are 3 ft. x 7 ft. and lumber that is 15 ft. long. This area must be accessible by forklift doors and must be 10 ft. wide and 12 ft. high.



WS-5
GLASS/CANVAS SHOP

function/purpose

To repair glass (i.e., windows) for vehicles on hardstand and to some extent, glass on organizational equipment and real property. To repair canvas on all equipment inclusive of tents.

issues and assumptions

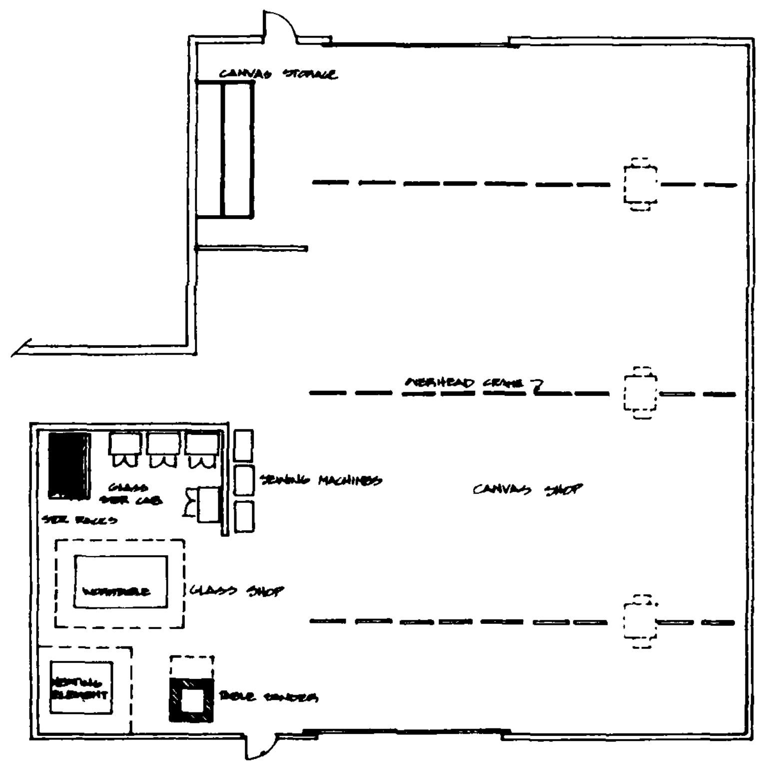
1. Glass and canvas repair:

   Glass and canvas repair is a normal DS function which is to be accomplished on-site by the contractor; therefore, facilities must be provided.

activities	personnel	equipment
1. Glass repair.	2 persons (LNs).	1. Air supply. 2. Work table, 6 ft. x 10 ft. 3. Wet belt sander, 3 ft. x 3 ft. x 6 ft. high. 4. Storage cabinet for tools/parts, 3 ft. x 5 ft. x 5 ft. 5. Heat element for warming glass, 6 ft. x 6 ft. x 3 ft. high. 6. Equipment in the storage area: a. Storage rack: 3 ft. x 5 ft. x 6 ft. b. Storage cabinet (2 each) - 2 ft. x 4 ft. x 5 ft. high.
2. Canvas repair.	4 persons (LNs).	1. 2 heavy-duty sewing machines. 2. 1 small sewing machine. 3. Overhead crane (3 each) - capacity of 1 ton each. 4. Storage cabinet (3 each) - 2 ft. x 4 ft. x 5 ft. 5. Racks for canvas rolls (balls) - 3 ft. x 8 ft. x 10 ft. (Hang on walls.) 6. Compressed air supply. 7. Forklift (small).

requirements	criteria
1. Adequate area. 2. Heating/ventilation. 3. Illumination.	1. Approximately 250-sq.-ft. work area (approximate dimensions should be 12 ft. x 15 ft.); a 50-sq.-ft. area for storage of bench stock. 2. $20^{o}C$. during winter, with 10 air changes per hour. 3. 500 lux, with adjustable fixtures for project tasks.
1. Adequate area. 2. Overhead crane between work area and storage. 3. Heating/ventilation. 4. Illumination.	1. 2400 sq. ft.; minimum of 40 ft. wide, 60 ft. long (to allow space to work on GP medium tents); 200 sq. ft. for canvas storage. 2. Capable of traversing to the canvas storage racks. A "U"-shape would be best. The doors must be 10 ft. wide and 12 ft. high to allow access by a forklift. 3. $20^{o}C$ during winter, with 10 air changes per hour. 4. 500 lux.

guidance



DI 21

WS-6
BREAK AREA/LATRINE/LOCKER

function/purpose	activities	personnel	equipment
Latrines, Showers, and Locker Rooms for Facility Personnel Use.	1. Washing. 2. Eliminating. 3. Self-grooming. 4. Personal storage.	All the personnel assigned to the facility; visitors.	1. Wash basins/soap holders. 2. Showers. 3. Urinals/water closets. 4. Mirrors. 5. Paper towel holders. 6. Lockers, benches. 7. Wastebaskets.
Personnel Training and Work Break Activities. A break, training, and conference area should be provided at a central location in the building where persons can assemble for daily work breaks and periodic group training sessions.	1. Training classes. 2. Breaks. 3. Conferences.	Could include all personnel working in the building, probably in groups of 20 percent of assigned maximum.	1. Tables with side chairs. 2. Vending machines. 3. Drinking fountain.

issues and assumptions

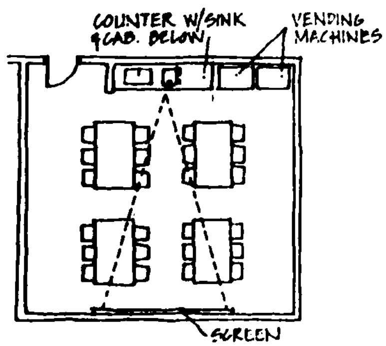
Toilet facilities shall be provided for men and women:

1. **Water consumption: In some locations, reducing water consumption is important. On military facilities, the installation of water-saving devices in latrines would reduce the amount of water that is used without affecting the operation of the equipment. This is especially important in geographic areas where water supplies are dwindling; in addition, it reduces water supply costs at all military installations.**

2. Flexibility of Break, Training Facilities:

Adequate space (area) for breaks, training, and/or conferences is required. Most facilities have fixed-wall construction on interior walls. Movable walls would allow flexibility in space allocation.

requirements	criteria	guidance
1. Illumination. 2. Power. 3. Plumbing fixtures. 4. Temperature. 5. Adequate ventilation. 6. Adequate size.	1. 250 lux. 2. 110V at least 24 in. above finished floor; (one 20A duplex/wall). 3. Provide water closets, urinals, and wash basins. Install water-saving devices in water closets, faucets, and showers. 4. 20°C during winter. 5. 4 air changes per hour. 6. Space allocation. A minimum size should be determined and specified based on number.	1. Use fluorescent fixtures for lighting. 2. Latrines should be centrally located and accessible from exterior and interior work areas. 3. Latrines should be provided in each inhabited building within a complex. 4. Latrines should be located in the parts of the building constructed as shop or office space. There are a number of different types of water-saving devices produced by commercial manufacturers that can be installed in water closets, faucets, and showers. 5. See OM-16 sheets for typical plan layouts.
1. Adequate size. 2. Smoking area ventilation (must be physically separated from vehicle bays). 3. Power. 4. Water sources for drinking fountain and coffee machines. 5. Illumination. 6. Communication. 7. AV screen.	1. A minimum size should be determined and specified. 2. Ventilation - 10 air changes per hour. 3. Provide one 120V-20A duplex receptacle for each vending machine. Minimum of one on each wall. 4. — 5. 500-lux, fluorescent ceiling fixtures, with one fixture at rear of space switched separately for minimum light level for AV presentations. 6. One wall telephone. 7. 8-ft. x 8-ft. pulldown screen.	1. Example: A room 24 ft. x 24 ft. (or 575 sq. ft.) will provide adequate space for tables and chairs, plus some standing room or space for vending machines and adequate distance for AV presentations. 2. The use of second-floor space for office area, conference rooms, etc. would release area on the ground floor for other activities.



TYPICAL BREAK./TRNG. ROOM

DI 21

WS-7
MAINTENANCE SUPPLY STORAGE

function/purpose

To store floor dry, clean and dirty shop towels, etc. ("janitor's closet").

issues and assumptions

activities

1. Receiving.
2. Inspecting.
3. Placement.
4. Storage/inventory.
5. Dispensing.

personnel

None.

equipment

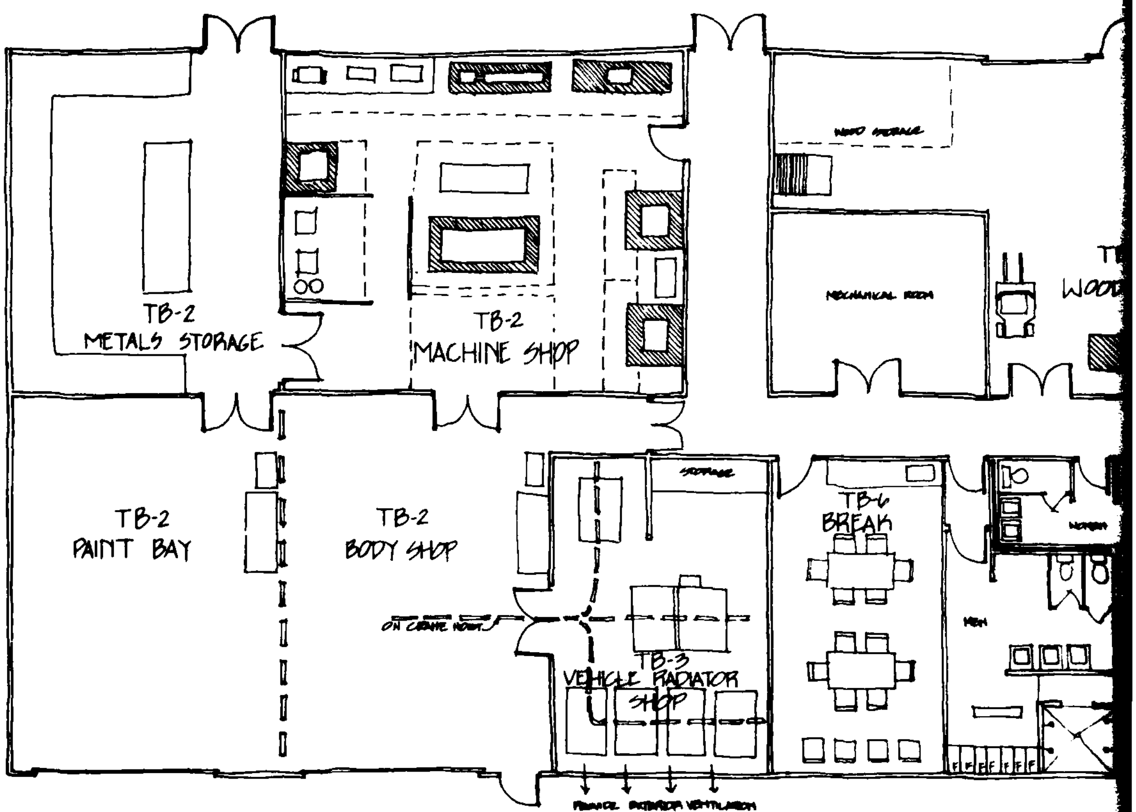
1. Shelves (20 lin. ft.).
2. Containers with lids (clean 55-gal. drums).
3. Service sink.
4. Hooks.

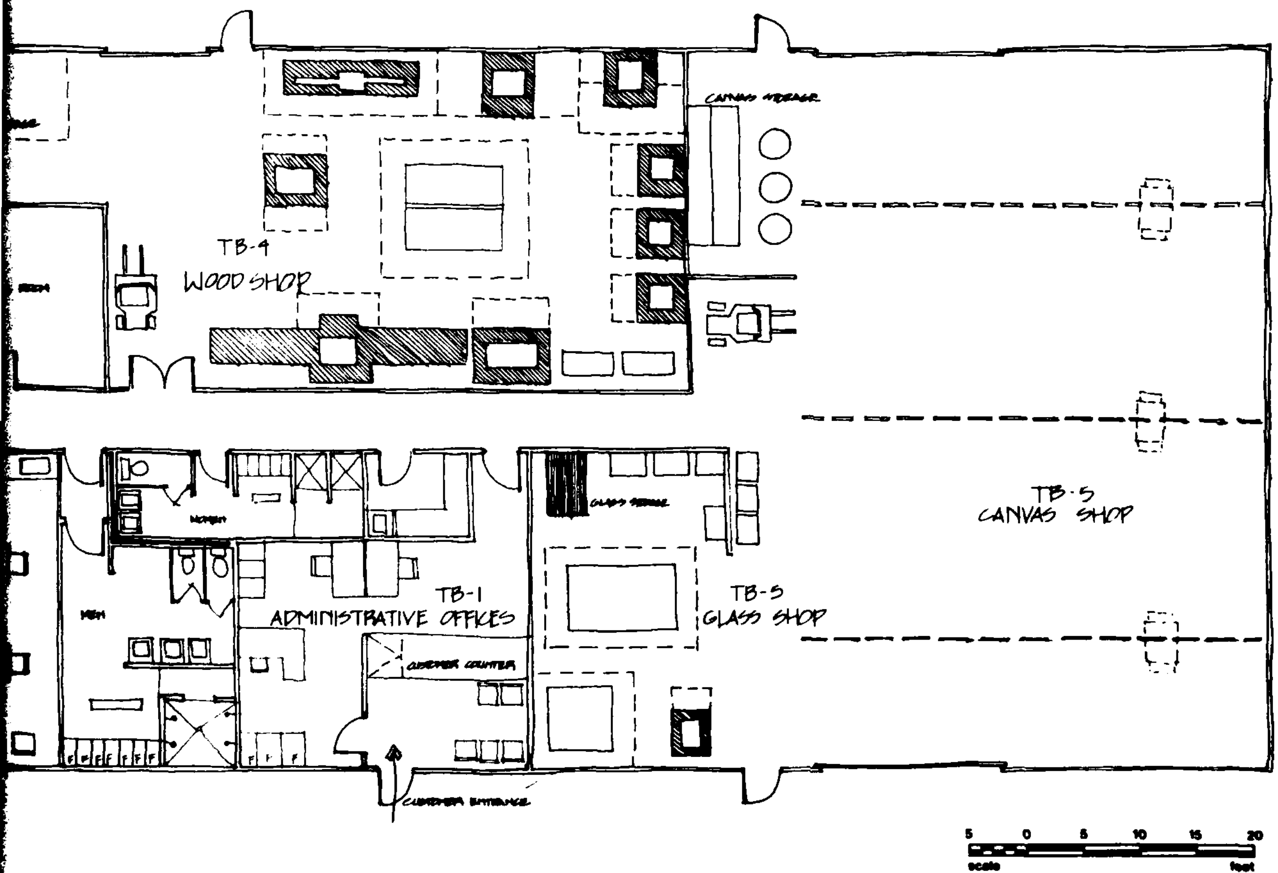
requirements	criteria	guidance
1. Adequate size.	1. 70 to 100 sq. ft.; minimum space to accommodate requirements is based on size and number of items to be stored.	1. Location: Should be central to common-use areas of the facility and have access to general circulation - near latrine. The floor drying compound and the dirty towel containers (drum) can be located in each shop space. Brooms, mops, cleaning supplies, etc., should be secured in the "janitor's closet."
2. Illumination.	2. 100 lux (use incandescent fixtures).	
3. Service sink.	3. Hot and cold water.	
4. Environmental control.	4. $20^{o}C$ during winter.	

NOTES

Facility Layout Concept

Work Shop Facility




TB-4
WOOD SHOP
TB-1
ADMINISTRATIVE OFFICES
TB-5
GLASS SHOP
TB-5
CANVAS SHOP
CUSTOMER COUNTER
CUSTOMER ENTRANCE
5 0 5 10 15 20
scale
feet

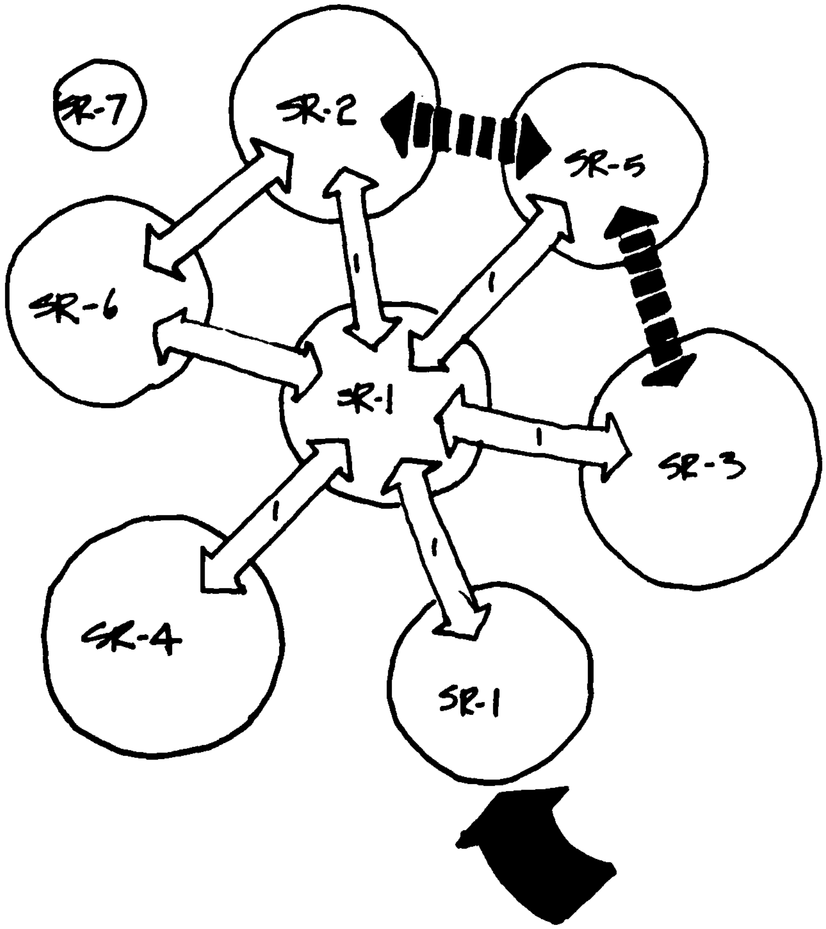
Shipping / Receiving Facility

Literature Information

Shipping and Receiving Facility 24.2

User Information

SR-1 Receiving Bay W/Loading Dock 24.6
SR-2 Inspection Bay 24.8
SR-3 Interior Holding Area 24.10
SR-4 Exterior Holding Area 24.12
SR-5 Office Area 24.14
SR-6 Break Area/Latrine/Lockers 24.16
SR-7 Maintenance Supply Storage 24.18
Facility Layout Concept



PURPOSE

11.1 A facility shall be PROVIDED to process the large flow of equipment and supplies arriving and leaving Type II Forward Storage Sites (FSTS) facilities. It shall have the capability to accept, uncrate, temporarily store, consign, and distribute all materials and equipment assigned to a specific site. (2)

ISSUES and ASSUMPTIONS

a) 11.1 Detailed planning and size of the facility will depend on site mission requirements and will be specifically justified in each case. (2)

b) 11.4 If rail service to the facility is desirable and economically feasible, the rail connection to the site boundary is REQUIRED. All rail facilities within the site shall be PROVIDED. (2)

c) 14.1 Loading ramps shall be PROVIDED at each facility to permit direct unloading of vehicles and equipment arriving by truck. Many of the supplies and equipment which will pass through Type II Forward Storage Sites (FSTS) facilities are too large for the Shipping and Receiving Building. It is essential that a loading ramp be provided so that large pieces of equipment can be unloaded and processed. A loading dock is also included as part of this facility. (2)

d) Installations that do not have the S/R facility should have a minor shipping/receiving functional area as indicated in 1a and 1b under requirements and criteria.

REQUIREMENTS

a) 11.2 The facility shall contain loading docks and facilities for both packaging and unpacking a wide variety of materials. (2)

b) 11.2 Facility shall also be provided with an area for storage and disposal of packing and unpacking wastes. (2)

c) 11.3 A secure freight storage area shall be PROVIDED adjacent to the facility to prevent pilferage of materials arriving and awaiting shipment. (2)

d) 11.5 A wet pipe sprinkler system shall be PROVIDED for fire protection purposes. (2)

e) 11.6 Toilets and break areas shall be PROVIDED. (2)

f) 14.3 Loading ramps shall be designed to support direct unloading of the largest object expected to be shipped into the site. (2)

CRITERIA

a) 14.4 The loading dock shall be 9 meters by 10 meters. (2)

c) 11.3 The storage area shall be provided with asphaltic concrete paving, security fencing, sentry box, gate, and lighting for night operations and security. (2)

f) 14.2 Loading ramps shall be concrete and the dock provided with bumpers to avoid damage to unloading vehicles. The dock shall be truck bed height, uncovered with guard rails, and provided with lighting for nighttime operations.

f) 14.3 Loading ramps shall not have a grade greater than 10%. (2)

GUIDANCE

REQUIREMENTS

g) 3.5.5 Area lighting will be provided on all buildings, loading ramps, washracks, grease racks, IFBS areas, exterior storage and work areas for night operations. (2)

CRITERIA

g) 3.5.4 50 lux at all outside storage areas, fueling points, work areas, and loading docks.(2)

GUIDANCE

NOTES

DI 24

SR-1
RECEIVING BAY W/LOADING DOCK

function/purpose

To receive or dispatch all supply shipments to and from the CEGE sites of a Division Equivalent.

issues and assumptions

activities

1. Unload transportation vehicles.
2. Uncrate items.
3. Verify documentation.
4. Evaluate items to be further inspected or sent to holding area for eventual storage.

personnel

2 - LNs.

equipment

1. Desk (30 in. x 60 in.) with chair.
2. Table (84 in. x 36 in.) with crating tool rack.
3. Portable conveyor (four 10-ft. sections) to holding area.
4. Forklift (4000-lb. capacity).
5. Packing waste bins.

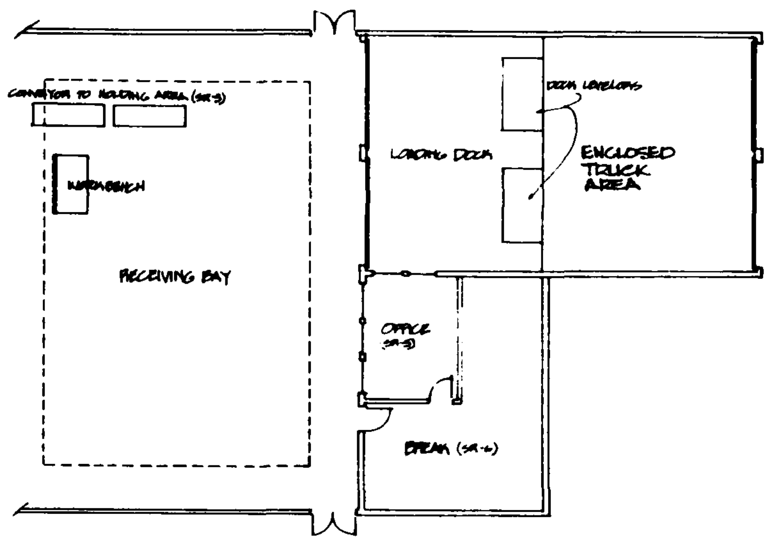
requirements

1. Adequate area.
2. Adjustable dock height.
3. Ramp to receiving area.
4. Entry doors.
5. Illumination.
6. Heating.
7. Power.

criteria

1. Loading dock - 28 ft. x 20 ft. interior. Receiving area (interior) approximately 2000 sq. ft.
2. Dock leveler.
3. 15^{o} slope.
4. Overhead door - 15 ft. x 20 ft. high; personnel door - 3 ft.
5. 50 lux at loading dock; 300 lux in receiving area.
6. $20^{o}C$ during winter.
7. 110V outlets; 3 duplex units at uncrating table area.

guidance



DI 24

SR-2
INSPECTION BAY

function/purpose

To inspect all vehicles and equipment shipped to the CEGE site.

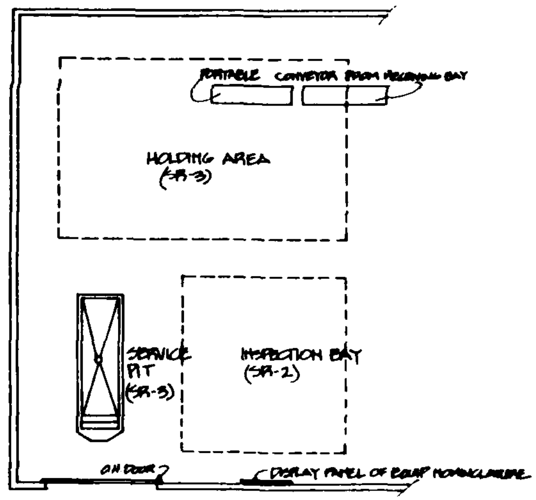
issues and assumptions

activities	personnel	equipment
1. Inspection of vehicles and equipment. 2. Serviceability tests of equipment.	2 persons.	1. Display panel of equipment nomenclature (84 in. x 48 in.) on wall.

requirements	criteria
1. Adequate area.	1. Approximately 24 ft. x 32 ft. (related to largest vehicle assigned to the CEGE site).
2. Heating/ventilation.	2. 20°C during winter, with 10 air changes per hour.
3. Illumination.	3. 300 lux with portable lights for inspections.
4. Power.	4. 110V outlets in perimeter walls - 10 ft. o.c.

guidance

1. Location adjacent to (or a part of) receiving area to evaluate acceptance criteria of vehicles and equipment that are not assigned directly to the storage facilities. Vehicles or equipment that are not acceptable after inspections return directly to the receiving area for recrating and out-shipment.



DI 24

SR-3
INTERIOR HOLDING AREA

function/purpose

To hold shipments of equipment and small vehicles for inventory and assignments to storage buildings. To store D.E. ASL repair parts and Prepositioned ASL repair parts.

(add DI 10 sheets)

issues and assumptions

activities

1. Inventory of shipments.
2. Installation of TILA items on equipment or vehicles prior to storage.

personnel

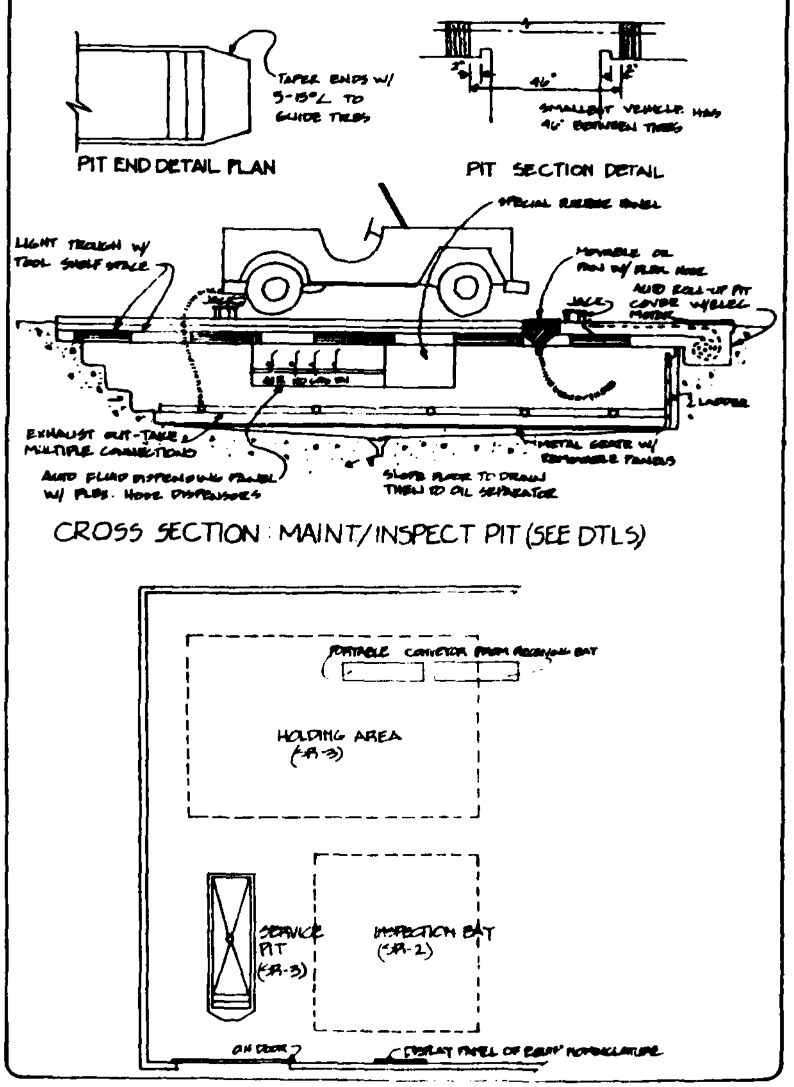
2 - LNs.

equipment

1. Workbench (7 ft. x ? ft.) with tool rack.
2. Use of forklift (4000-lb. capacity).
3. Portable conveyor unit from receiving bay.

requirements	criteria
1. Adequate area.	1. Approximately 1900 sq. ft. (as two vehicle maintenance bays), and 20,000 sq. ft. for ASL storage.
2. Inspection pit.	2. One bay to have pit (see OM-3).
3. Power.	3. 110V service.
4. Illumination.	4. 300 lux.
5. Environmental control.	5. $20^{\circ}C$. during winter.
6. Communications.	6. -

guidance



DI
24

SR-4
EXTERIOR HOLDING AREA

function/purpose

To hold shipments of large vehicles for inventory and assignments to storage buildings.

issues and assumptions

activities	personnel	equipment
1. Inventory of large vehicle shipments. 2. Installation of TILA items on large vehicles prior to storage.	3 - LNs.	None specifically permanently located in this area.

requirements	criteria	guidance
1. Adequate area.	1. Approximately 12,000 sq. ft.	
2. Hardstand surface.	2. Need concrete surface for approximately 6000 sq. ft.; remainder may be asphalt.	
3. Security for equipment.	3. 8-ft., chain-link fence with 3-barbed-wire top, and two 12-ft.-wide gates.	
4. Illumination.	4. 5-lux security lighting.	
5. Ramp for loading/unloading.	5. 3 ft., 10 in. height with ramp to hardstand level; 15 ft. x 20 ft. level area at top of ramp.	

DI 24

SR-5
OFFICE AREA

function/purpose

To administer the flow of equipment and supplies arriving and leaving the CEGE company-level site.

issues and assumptions

activities

1. Verify documentation of equipment received.
2. Administer personnel.
3. Maintain inventory records.

personnel

1 - military, 1 - LN.

equipment

1. 2 desks (30 in. x 60 in.) with chairs.
2. Bookcase (48 in. x 15 in.).
3. File (1.55 in. x 28 in.).

requirements

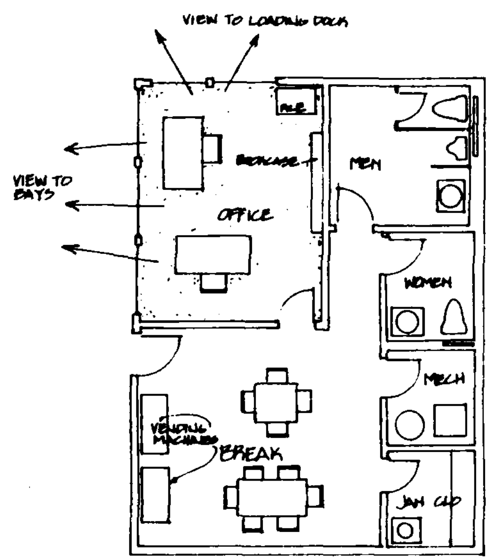
1. Adequate space.
2. Power.
3. Lighting.
4. Heating, cooling, ventilation.
5. Communication.

criteria

1. 80 to 90 sq. ft. per person with additional space for equipment and files.
2. 110V duplex outlets at each 10 ft. of wall.
3. 500 lux with fluorescent fixtures.
4. 20^{o}C.
5. Coordinate telephone and intercom needs with the installation.

guidance

1.. Locate office area to have window overview of bay areas, exterior holding area, and the loading dock.



DI 24

SR-6
BREAK AREA/LATRINE/LOCKERS

function/purpose

Latrines, Showers, and Locker Rooms for Facility Personnel Use.

Personnel Training and Work Break Activities. A break, training, and conference area should be provided at a central location in the building where persons can assemble for daily work breaks and periodic group training sessions.

issues and assumptions

Toilet facilities shall be provided for men and women:

1. Water consumption: In some locations, reducing water consumption is important. On military facilities, the installation of water-saving devices in latrines would reduce the amount of water that is used without affecting the operation of the equipment. This is especially important in geographic areas where water supplies are dwindling; in addition, it reduces water supply costs at all military installations.

2. Flexibility of Break, Training Facilities:

Adequate space (area) for breaks, training, and/or conferences is required. Most facilities have fixed-wall construction on interior walls. Movable walls would allow flexibility in space allocation.

activities	personnel	equipment
1. Washing. 2. Eliminating. 3. Self-grooming. 4. Personal storage.	All the personnel assigned to the facility; visitors.	1. Wash basins/soap holders. 2. Showers. 3. Urinals/water closets. 4. Mirrors. 5. Paper towel holders. 6. Lockers, benches. 7. Wastebaskets.
1. Training classes. 2. Breaks. 3. Conferences.	Could include all personnel working in the building, probably in groups of 20 percent of assigned maximum.	1. Tables with side chairs. 2. Vending machines. 3. Drinking fountain.

requirements	criteria	guidance
1. Illumination. 2. Power. 3. Plumbing fixtures. 4. Temperature. 5. Adequate ventilation. 6. Adequate size.	1. 250 lux. 2. 110V at least 24 in. above finished floor; (one 20A duplex/wall). 3. Provide water closets, urinals, and wash basins. Install water-saving devices in water closets, faucets, and showers. 4. 20°C during winter. 5. 4 air changes per hour. 6. Space allocation. A minimum size should be determined and specified based on number.	1. Use fluorescent fixtures for lighting. 2. Latrines should be centrally located and accessible from exterior and interior work areas. 3. Latrines should be provided in each inhabited building within a complex. 4. Latrines should be located in the parts of the building constructed as shop or office space. There are a number of different types of water-saving devices produced by commercial manufacturers that can be installed in water closets, faucets, and showers. 5. See OM-16 sheets for typical plan layouts.
1. Adequate size. 2. Smoking area ventilation (must be physically separated from vehicle bays). 3. Power. 4. Water sources for drinking fountain and coffee machines. 5. Illumination. 6. Communication. 7. AV screen.	1. A minimum size should be determined and specified. 2. Ventilation - 10 air changes per hour. 3. Provide one 120V-20A duplex receptacle for each vending machine. Minimum of one on each wall. 4. -- 5. 500-lux, fluorescent ceiling fixtures, with one fixture at rear of space switched separately for minimum light level for AV presentations. 6. One wall telephone. 7. 8-ft. x 8-ft. pulldown screen.	

DI 24

SR-7
MAINTENANCE SUPPLY STORAGE

function/purpose

Storage of floor dry, clean and dirty shop towels, etc. (janitor's closet).

issues and assumptions

activities

1. Receiving.
2. Inspection.
3. Placement.
4. Storage/inventory.
5. Dispensing.

personnel

None.

equipment

1. Shelves (20 lin. ft.).
2. Containers with lids (clean 55-gal. drums).
3. Service sink.
4. Hooks.

requirements

1. Adequate size.
2. Illumination.
3. Service sink.
4. Environmental control.

criteria

1. 70 to 100 sq. ft. minimum space to accommodate requirements based on size and number of items to be stored.
2. 100 lux (used incandescent fixtures).
3. Hot and cold water.
4. 20°C during winter.

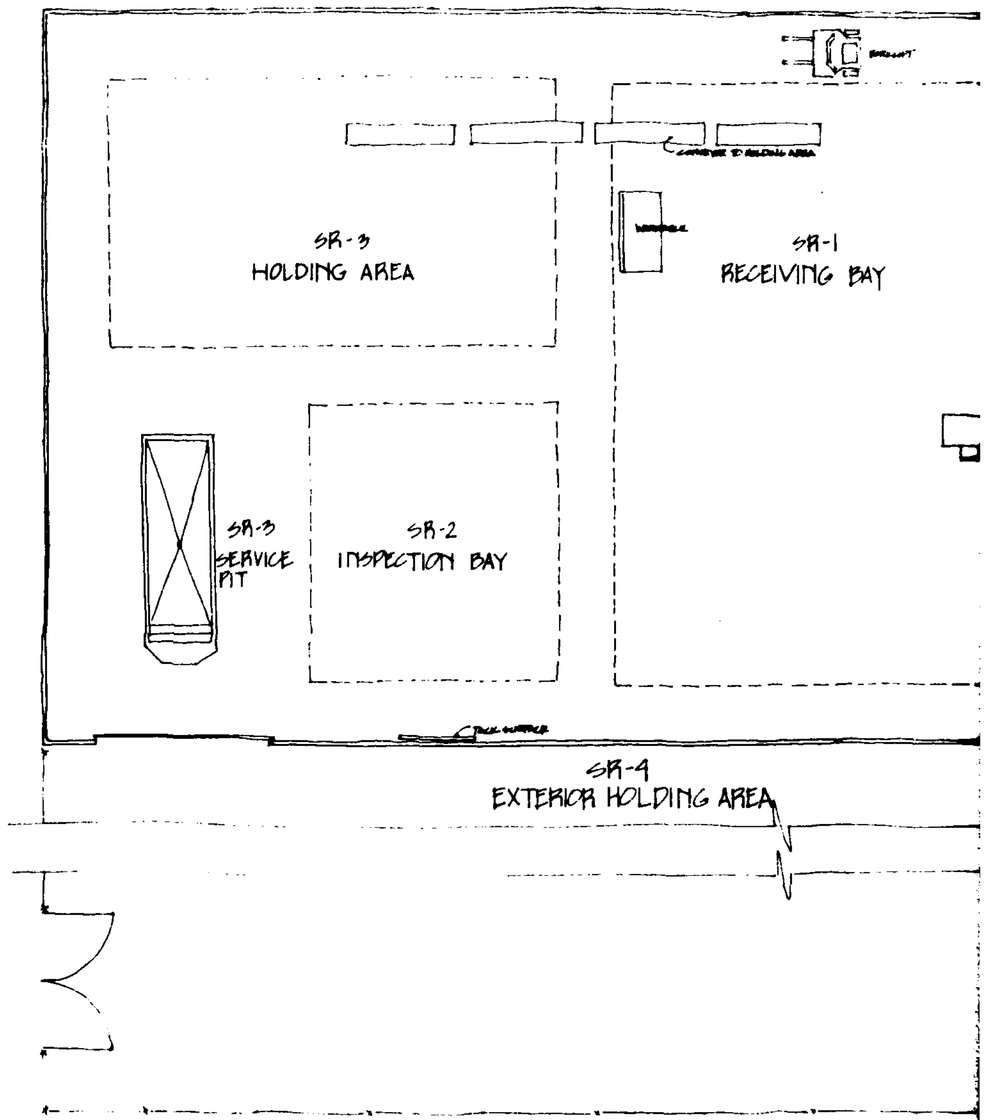
guidance

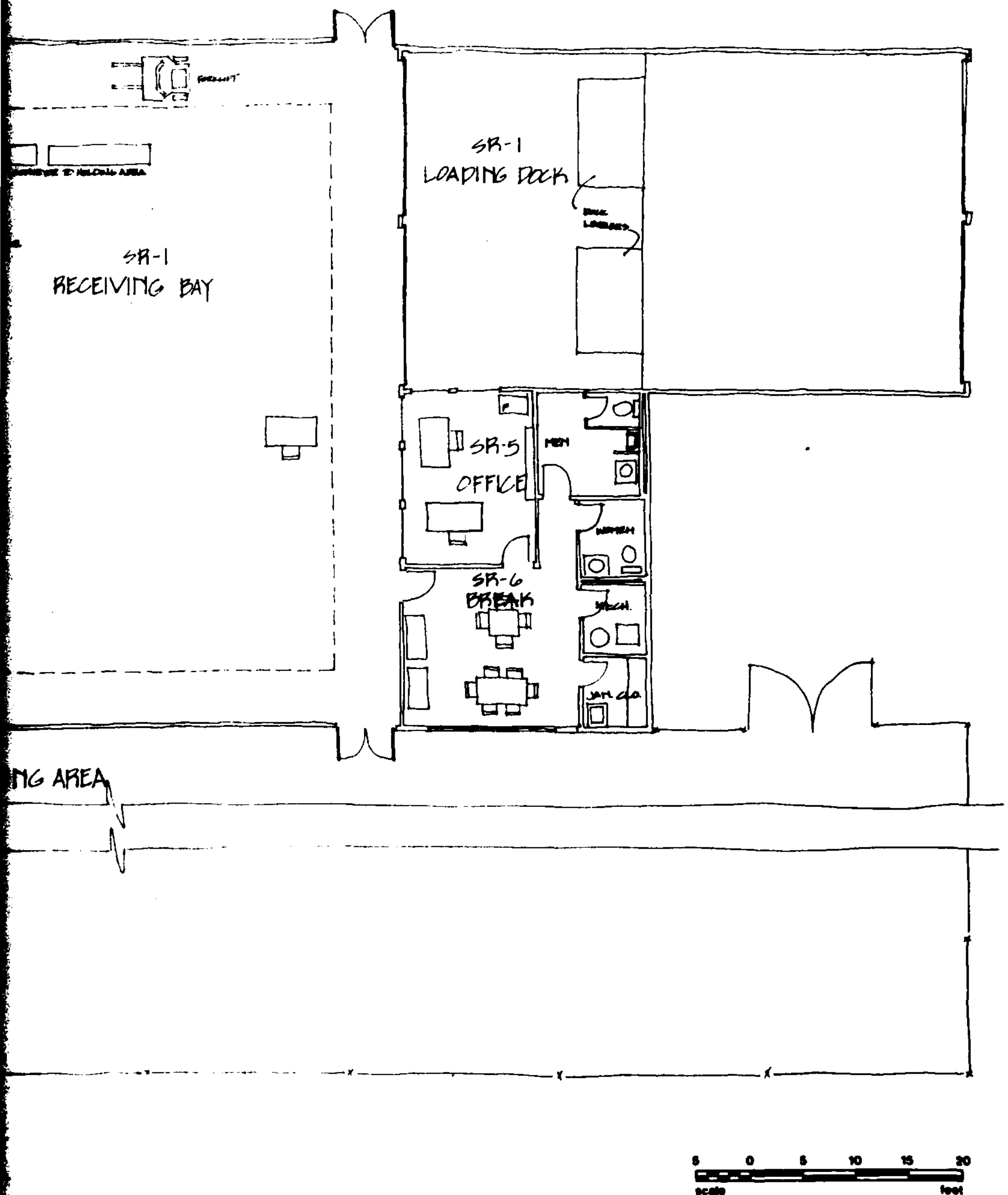
1. Location: Should be central to common-use areas of the facility and have access to general circulation near the inspection bay. Clean towels, floor drying compound and the dirty-towel containers (drum) can be located inside the inspection bay; brooms, mops, cleaning supplies, etc., should be secured in the "janitor's closet."

NOTES

Facility Layout Concept

Shipping/Receiving Facility




SR-1
LOADING DOCK
SR-1
RECEIVING BAY
SR-5
OFFICE
MEN
WOMEN
SR-6
BREAK
MECH.
JAN. CLO.
NG AREA
5 0 5 10 15 20
scale
feet

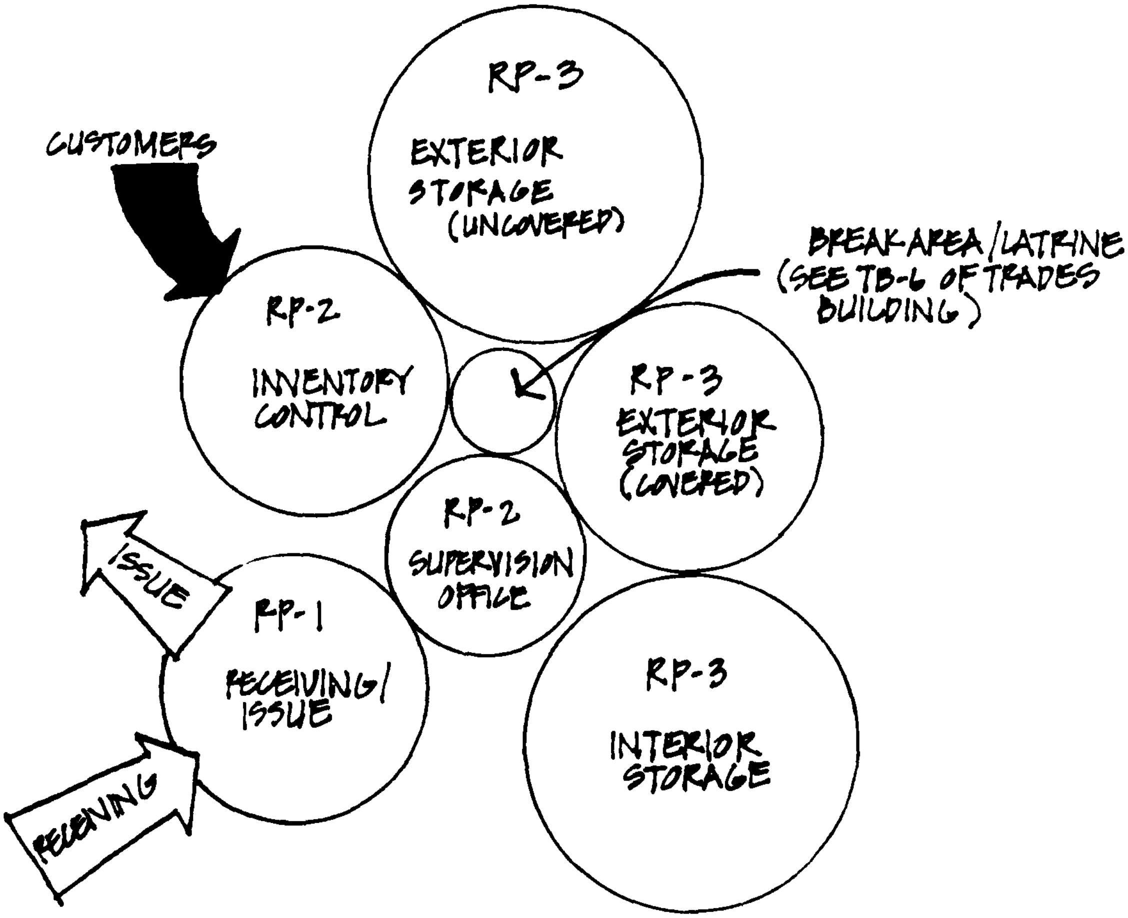
Repair Parts (Class IX) Supply and Storage

Literature Information

Class IX Repair Parts Storage Facility	25.2
Controlled Humidity Warehouses	25.6
Stress Tension Structures	25.10

User Information

RP-1	Receiving/Issue	25.12
RP-2	Supervision and Inventory Control	25.14
RP-3	Supply Storage	25.16
	Facility Layout Concept	



PURPOSE

ISSUES and ASSUMPTIONS

a. 4.1.1 Weapons, Vehicles, COMMO Equipment, etc. will be stored in either:

-Controlled Humidity Storage Structures
-Individual Flexible Barrier Storage (IFBS)
-Open Storage (2)

b. 4.13.1 Floor space should satisfy 15 days of supply requirement and will be specifically justified in each case. (2)

c. 3.1 Covered space is preferred. When sufficient covered space for all items to be stored is not available, priority should be given to items which are most susceptible to deterioration from the elements. SB 38-8-1 should be used as a guide for establishing the items most susceptible to deterioration. (6)

d. 3.1 Open sites should be improved hardstand, if available. Unimproved sites should be firm, well-drained, and kept free of excessive vegetation. (6)

e. 2.5.7.2 Narrow aisle operating equipment will be used to maximum extent practicable to effect reduction in or minimizing of aisle widths. (3)

REQUIREMENTS

a. 4.13.1 CHS storage will be PROVIDED for prescribed or authorized load list of spare parts. (2)

b. 4.2.1 CHS warehouses will be of semi-permanent type construction providing the controlled humidity storage requirements can be met. (2)

c. 4.2.1 An annex to each warehouse will be PROVIDED to house dehumidifying equipment. Necessary dehumidifier units will be PROVIDED. (2)

d. 3.5 The lighting system shall provide minimum illumination intensities as follows:

CRITERIA

d. 3.5.1 100 lux inside warehouses and storage buildings, measured at floor level. (2)

d. 3.5.3 5 lux outside of all storage and administrative buildings at midpoint of lower edge of each door only.

GUIDANCE

a. 1.2 For all CHS warehouses and other buildings, austere construction will be employed as far as possible. Austere construction means light prefabricated metal, cement, or cinder block or other low cost nonflammable construction, which will insure sufficient protection against climatic conditions of the site. (2)

b. 1.2 For those materials and supplies which may deteriorate or be damaged if stocked in the open, roofed open storage or controlled humidity storage will be PROVIDED. (2)

REQUIREMENTS

e. 2.5.7.3 As a means of contributing to storage regularity and also to provide a desirable safety factor, warehouse aisle boundaries will be clearly identified by painted stripes. (3)

CRITERIA

e. 2.5.7.3 The width of these stripes will not exceed 4 inches nor be reduced below 3 inches, and will be consistent throughout an installation's warehouses. White Gloss No. 17875, as identified in Federal Standard TT-C-595, and as required by AR 385-30 will be used for this purpose. Paint will conform to Federal Specification TT-P-115, Paint, Traffic, Highway. (3)

GUIDANCE

NOTES

PURPOSE

ISSUES and ASSUMPTIONS

1.2
For those materials and supplies which may deteriorate or be damaged if stocked in the open, roofed open storage or controlled humidity storage will be PROVIDED. (2)

3.10.2.1 In high humidity environment, conventional storage facilities do not afford adequate protection to certain types of supplies preserved Level C against damage and deterioration that can result from excessive humidity. This is particularly applicable where supplies are to remain in storage for extended periods. To insure that the capability of material to perform its intended function will not be impaired or that supplies will not become unfit for consumption as a result of exposure to excessive humidity, methods have been developed to provide control of humidity within storage warehouses. (7)

3.10.7.10.2 Where battery-powered equipment cannot be or is impracticable to obtain or use in controlled humidity storage, gasoline-engine-powered equipment can be used with certain precautions. In use of such equipment, certain factors must be considered. (7)

3.10.7.10.2.2 When utilizing engine-driven materials handling equipment in controlled humidity warehouses, any concentration of carbon monoxide gas which exceeds 100 parts of carbon monoxide per 1,000,000 parts of air must be prevented. (7)

3.10.3.3 The modern, permanent warehouses (WW II and later) are preferred for the storage of current distribution stocks. These warehouses will be converted to controlled humidity space (by section or complete warehouse) as required and permitted by available funds. (7)

3.10.3.5 Sections of warehouses used exclusively for shipping, receiving, and box shop operations normally will not be converted to controlled humidity space. (7)

3.10.3.6 Considering cost of installation and continuing cost of operation, controlled humidity space can be installed most economically in permanent and standard portable frame warehouses, such as: (7)

3.10.3.6.1 Permanent-type standard warehouses constructed since 1950, 200'X 1000', built-up roof, concrete roof decking with steel framing or laminated wood roof framing, block or brick side walls and dock level floors. (7)

3.10.3.6.2 Permanent-type warehouses, gabled roof with steel framing; block or tile walls, windows, and louvers. (7)

3.10.3.6.3 Permanent type warehouses constructed between 1940 and 1950, 180'x1440' (or multiples of 240' sections), with monitor in center third of roof, block or brick side walls, and dock level floor. (7)

ISSUES and ASSUMPTIONS

1. Examination and evaluation of existing structures (11):

If existing buildings are being considered for reuse as POMCUS facilities it is necessary to analyze the renovation costs against "new construction" costs. Major costs have been required to make existing buildings responsive to POMCUS activities; especially,

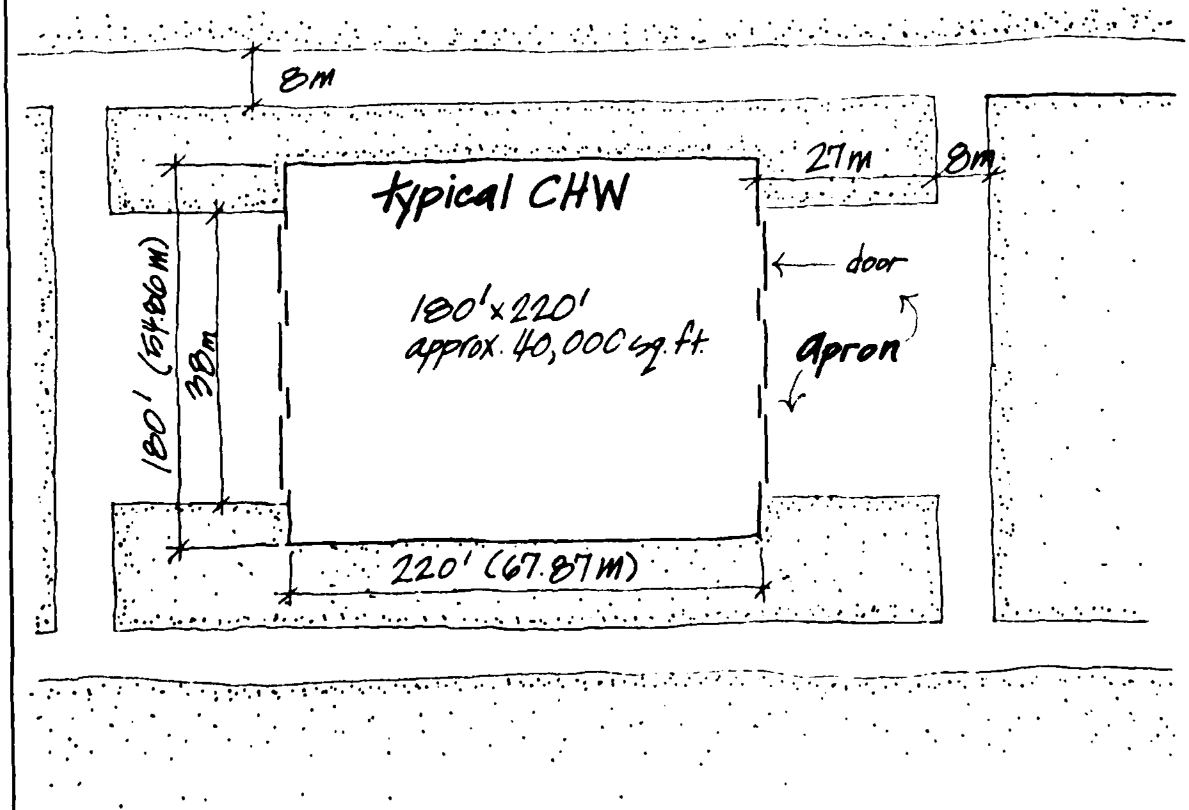
1) control of humid air infiltration into CHW at existing openings,

2) adequate insulation for temperature controlled buildings,

Roads per CHW: 500m x 8m = $4000m^2$

Turnpad per CHW: 1@ 10m x 20m = $200m^2$

Aprons (2 per CHW): 1=38mx27m=$1026m^2$ each
or $2052m^2$ per CHW



REQUIREMENTS

a. 4.2.1 CHS warehouses will be of semi-permanent type construction providing the controlled humidity storage requirement can be met. (2)

b. 4.2.1 An annex to each warehouse will be PROVIDED to house dehumidifying equipment. Necessary dehumidifier units will be PROVIDED. (2)

c. 3.10.3.1 Controlled humidity storage space should be provided for areas where the outdoor relative humidity is 40 percent or above for more than 50 percent of the total time. (3)

d. 3.10.7.1 Controlled humidity equipment should be located within the warehouse so as not to obstruct traffic aisles. (3)

e. 3.10.7.2 It is essential that the entrance of humid air into controlled humidity warehouses be kept to the minimum in order to maintain the relative humidity at desired level. Door control is of paramount importance, since the greatest source of moisture penetration is through open doors. An alarm system may be provided to signal open doors. (3)

CRITERIA

a. 3.10.3.2 Equipment for the control of humidity in storage space will be operated so as to maintain 40 percent relative humidity (RH). (3)

GUIDANCE

1.2
For all CHS warehouses and other buildings, austere construction will be employed as far as possible. Austere construction means light prefabricated metal, cement, or cinder block or other low cost nonflammable construction, which will insure sufficient protection against climatic conditions of the site. (2)

NOTES

PURPOSE

4.2.2 Stress Tension Structures (STS) can be used as warehouses for controlled or uncontrolled humidity storage. They can provide economical storage space for a wide variety of items. (2)

ISSUES and ASSUMPTIONS

4.2.2.1 When STS are used for storage in Type II Forward Storage Sites (FSTS), they shall have a 10 to 12-year life expectancy and will be replaced upon termination of structure life. (2)

When STS facilities are considered to be Real Property (rather than as "relocatable structures"), OM&A funding for continuing maintenance should be considered.

REQUIREMENTS

a. 4.2.2.1 When STS are used for storage in Type II Forward Storage Sites (FSTS), the structures themselves and all lighting, heating, and humidity control equipment shall be PROVIDED. (2)

b. 4.2.2.1 Concrete floor slab, foundation, and all utilities connections shall be PROVIDED. (2)

c. 4.2.2.2 Each STS shall be PROVIDED with two personnel doors. (2)

d. 4.2.2.2 Each STS shall be PROVIDED with two vehicle access doors. (2)

e. 4.2.2.2 Each STS shall be PROVIDED with a flexible pavement access apron. (2)

CRITERIA

GUIDANCE

DI
25

RP-1

RECEIVING/ISSUE

function/purpose

To provide for receiving all Class IX repair parts and prepare them for storage.

issues and assumptions

activities

1. Unloading.
2. Unpacking.

personnel

2 - local nationals.

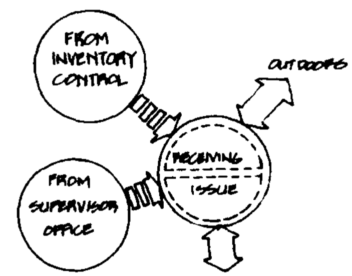
equipment

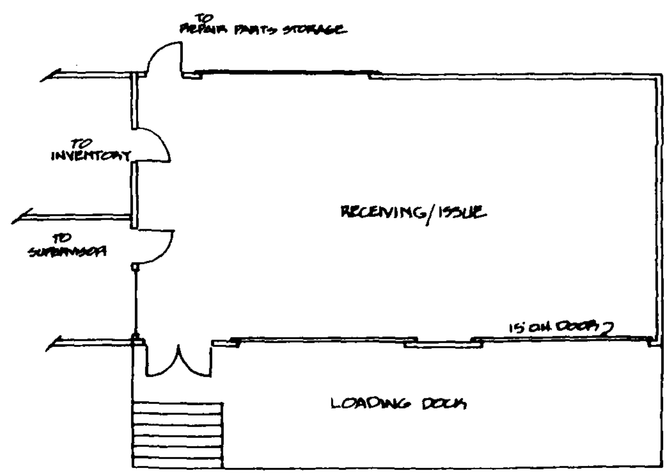
1. Forklift.
2. 2 - pallet risers.
3. 2 - "shopping" carts.
4. Counters 3 ft. x 8 ft.
5. Table with 2 chairs.
6. Trash containers.

requirements	criteria
1. Adequate space.	1. (Receiving/issue space is considered as a shared space). 20 ft. x 50 ft. open space with loading dock (30 ft.).
2. Power.	2. 110/220V service.
3. Temperature and ventilation.	3. 20^{o}C and 10 air changes per hour.
4. Lighting.	4. 300 lux at work counters.
5. Access:	
a. Personnel.	5a. 2 - rollup overhead doors for outdoor access. Double swinging doors between receiving/issue.
b. Visual.	5b. Sliding windows between receiving/issue.
6. Communication.	6. Intercom to inventory control space.
7. Surfaces.	7. Special "non-skid" finish concrete floor.

guidance

The receiving function of Class IX repair parts may take place in the same space allocated for the issue function. The space should have outdoor access, along with visual, and personnel access from both inventory control and the supervisor's office.





DI 25

RP-2

SUPERVISION AND INVENTORY CONTROL

function/purpose

Providing personnel supervision and providing for control and documentation of the inventory and flow of Class IX repair parts through the POMCUS site.

issues and assumptions

activities	personnel	equipment
1. Request: a. Edit shop order. b. Screen stock inventory. c. Initiate order. 2. Issues. 3. Reconcile. 4. Inventory.	3 - local nationals.	1. 3 - desks (30 in. x 60 in.) with chair. 2. File index table (6 ft. x 10 ft.). 3. 2 - microfiche on tables. 4. 1 - typing stand. 5. Customer counter (4 ft. x 12 ft. built in). 6. Customer seating for 3. 7. 40 lin. ft. bookshelves (built in). 8. Tackboard (36 in. x 50 in.). 9. 1 - 4-drawer file.
5. Supervise personnel.	1 - military supervisor.	1. Desk (30 in. x 60 in.) with chair. 2. 1 - side chair.

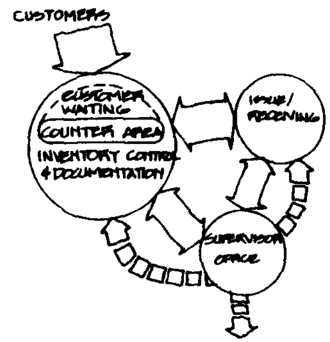
requirements	criteria
1. Adequate space.	1a. Inventory control - 3 work stations at 80 sq. ft. to 90 sq. ft. each. 1b. Supervisor's office (private office) - 120 sq. ft.
2. Lighting.	2. 600 lux at work surface.
3. Power.	3. 110V duplex outlets.
4. Temperature and ventilation.	4. 20°C and 10 air changes per hour.

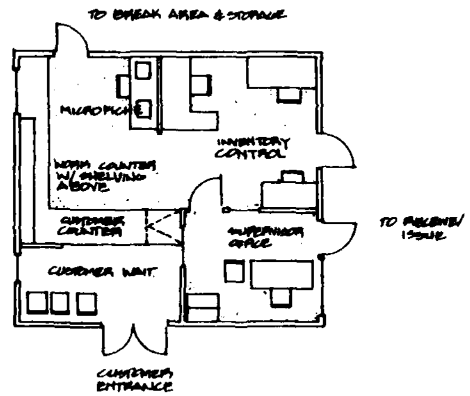
guidance

1. The inventory control and documentation area must be adjacent to the issue/receiving area, providing both personnel and visual access to that area.

2. The supervisor's office should allow visual access to all areas within inventory control and documentation as well as issue/receiving and exterior storage areas.

3. Within the inventory control and documentation area, the customer waiting area will be separated from the personnel area by a customer counter.





DI 25

RP-3
SUPPLY STORAGE

function/purpose

To provide storage for all Class IX repair parts.

issues and assumptions

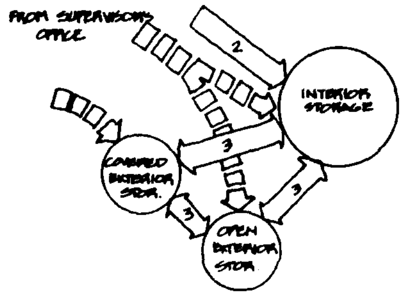
activities	personnel	equipment
1. Shelving and unshelving repair parts.	2 - local nationals.	1. Adjustable shelving.

requirements	criteria
Interior storage:	
1. Adequate space:	1. Combined a + b spaces should total 9000 sq. ft. for the organizational level and 10,000 sq. ft. for the direct support/organizational levels. Space should be secured with fencing.
a. Shop stock assets.	
b. Job order warehouse.	
2. Lighting.	2. 150 lux at aisles.
3. Temperature.	3. $20^{o}C$.
4. Access/circulation.	4. Double access gate needed.
5. Surfaces.	5. Non-skid cement flooring.
6. Power.	6. 110V.
Exterior storage:	
1. Adequate space:	
a. Covered.	1a. 3000 sq. ft. for organizational level. 5000 sq. ft. for direct support/organizational level.
b. Uncovered.	1b. 5000 sq. ft. for direct support/organizational level.
2. Lighting.	2. 100 lux at aisles for night issue.
3. Power.	3. 110V.
4. Access.	4. Double access gates into each space, minimum of 6 ft. wide.
5. Surfaces.	5. Concrete for main circulation; other bituminous.
6. Security fencing around three areas of storage.	6. 8-ft. chain-link fencing with 3-wire diagonal top.

guidance

1. The interior storage area should be close to the supervisor's office, inventory control, and issue/receiving area.

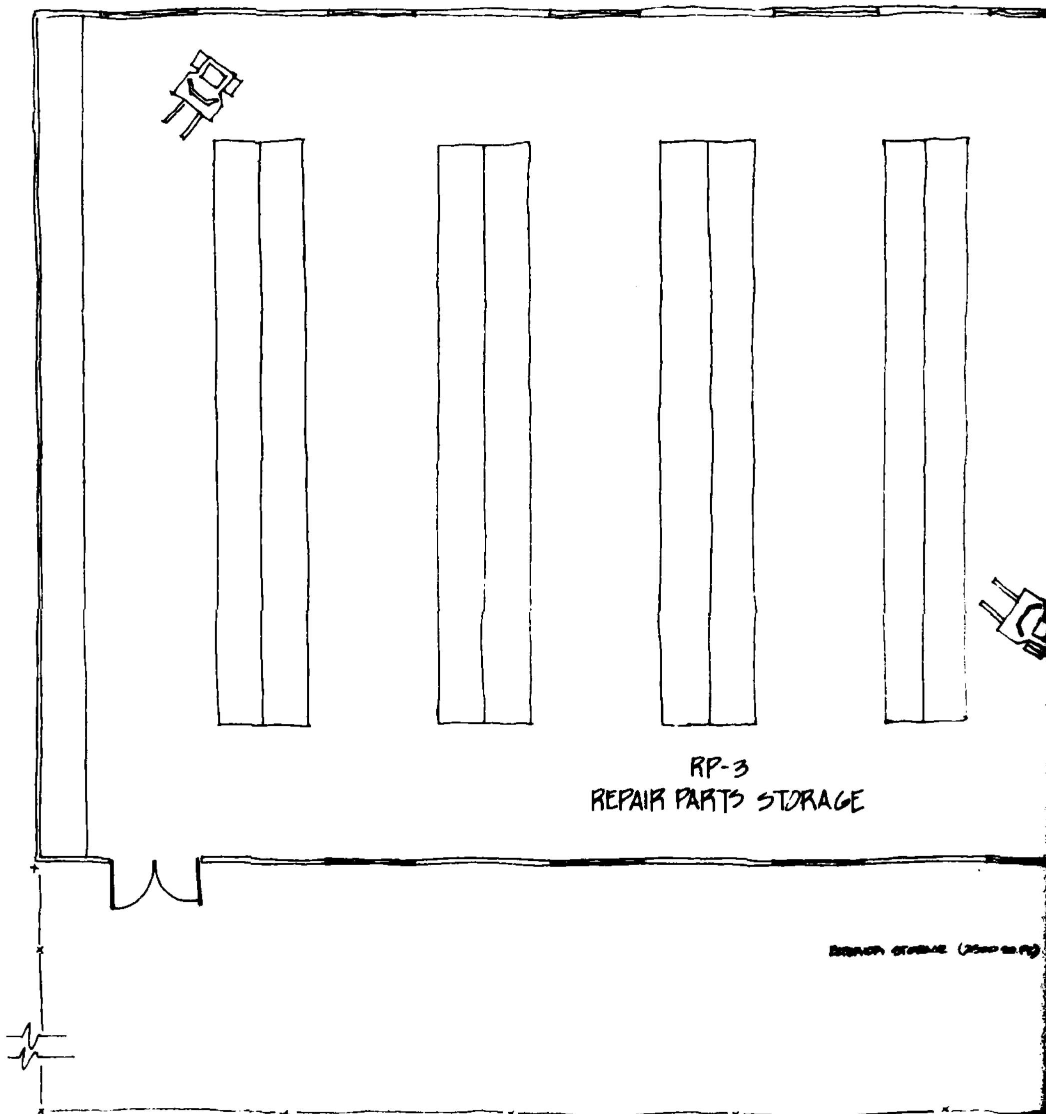
2. The supervisor must have visual access to all storage areas.

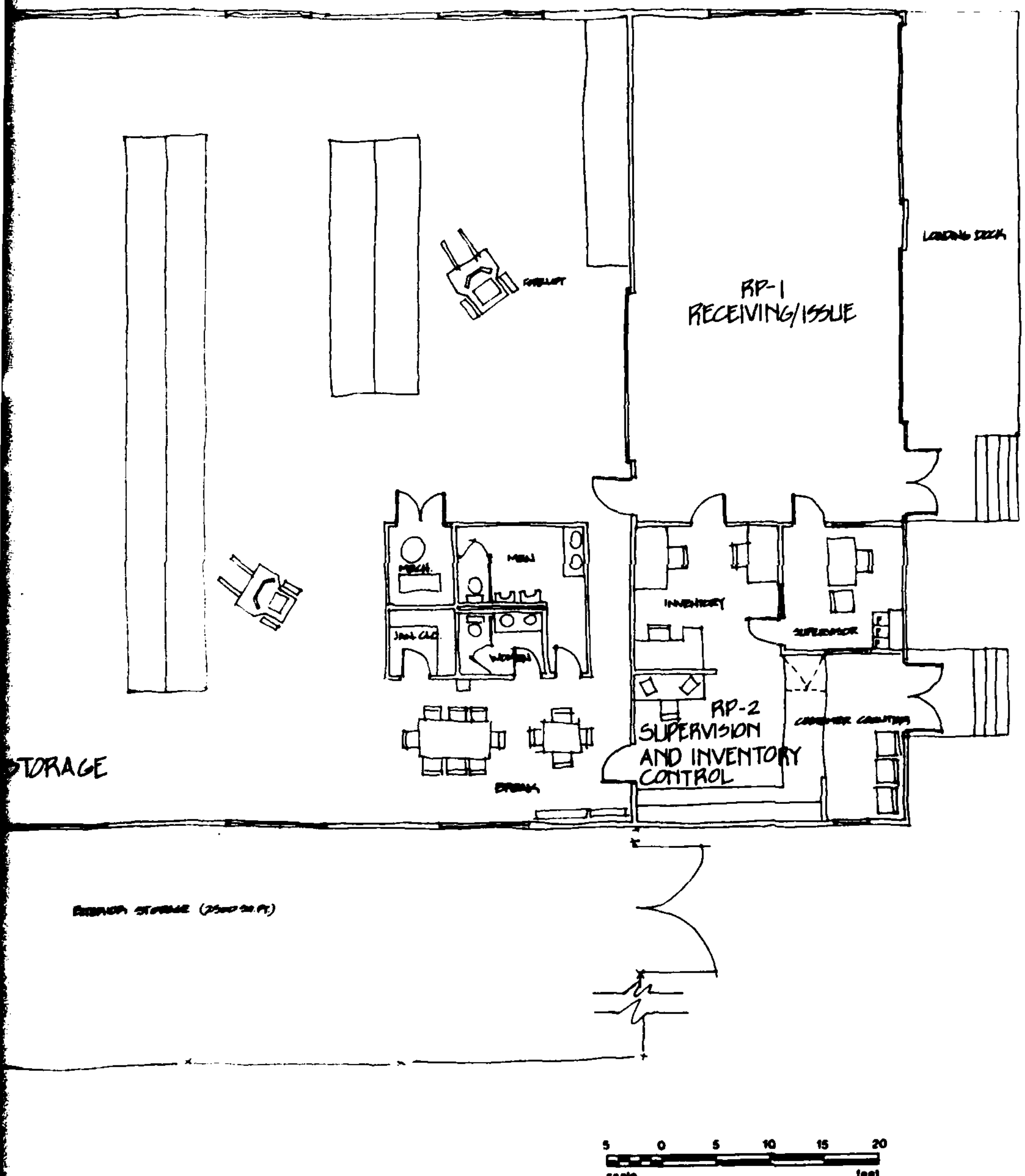


NOTES

Facility Layout Concept

Repair Parts (Class IX) Supply and Storage




RP-1
RECEIVING/ISSUE
LOADING DOCK
MECH.
MEN
JAN. CLO.
WOMEN
INVENTORY
SUPERVISOR
RP-2
SUPERVISION
AND INVENTORY
CONTROL
BREAK
TORAGE
5 0 5 10 15 20
scale
feet

Site Security

Literature Information

Security Facilities: Operations and Guard Building. Security Fence 27.2

User Information

SS-1 Perimeter Security and Sentry Post 27.8
SS-2 Internal Security and TOE Parking 27.10

PURPOSE

ISSUES and ASSUMPTIONS

5.2 If the primary water supply required to satisfy the above demand is inadequate, or is not available, ground level storage points or open tanks will be PROVIDED. (2)

3.1 Building layout, dimensions, and technical details of construction shall be in agreement with host nation standards and requirements. (2)

REQUIREMENTS

a) 2.1 Security facilities shall be PROVIDED for each Type II Forward Storage Site (FSTS). These facilities will consist of a security fence around the entire site, guard headquarters building, sentry boxes, gates, and lighting at site entrances and perimeter. (2)

b) 3.1 One building shall be PROVIDED for guarding of the site inside the fence. (2)

CRITERIA

b) 3.1 Guard building shall be designed with an area of three square meters of useable space per man with a total useable space computed at twice the number of men assigned to guard duties plus four men who would normally be supervising the guard detail. The gross interior area will be the useable area determined plus no more than 25 square meters to provide the needed office, storage, service area, corridors and other necessary functions. The building shall be connected to power and water-distribution systems and shall be heated to a temperature of 20° C. (2)

GUIDANCE

REQUIREMENTS

c) 1.4 Offices and shops not having natural ventilation will have mechanical ventilation. (2)

d) 3.5 The lighting system shall provide minimum illumination intensities as follows: (2)

e) 9.3 Internal communications will be PROVIDED for one standard manual switchboard to accommodate a necessary number of lines, one terminal equipment and necessary cabling installed in the operations and guard building. (2)

f) 9.4 Two normal telephones will be PROVIDED in the guard building.(2)

g) 5.1.2 DOMESTIC USAGE. A water distribution system for domestic and industrial usage will be PROVIDED ensuring an adequate rate of flow to all guard and administrative buildings, and to all maintenance facilities. (2)

CRITERIA

c) 1.4 Mechanical ventilation will provide ten air changes per hour, unless otherwise noted. (2)

d) 3.5.2 250 lux inside of all maintenance, guard and administration facilities. (2)

d) 3.5.3 5 lux outside of all storage and administrative buildings at midpoint of lower edge of each door only. (2)

GUIDANCE

REQUIREMENTS

CRITERIA

h) 2.1.1 The site security fence will be 2.1 m high, surmounted by outrigger arms 45 cm long, slanted outward from the inclosure at 45°. Vertical outriggers are also acceptable if space requirements preclude the use of slanted outriggers. (2)

h) 2.1.2 Concrete or metal posts will be PROVIDED and fence posts will be set in concrete, spaced not more than 3.00 m apart. The fence will be chain-link double galvanized iron or steel wire. 3.1 mm in diameter and a diamond mesh, size 50 X 50mm. (2)

h) 2.1.3 The outrigger will carry three strands of barbed wire. (2)

h) 2.1.8 Clear zones shall be provided on each side of the site security fence 6 meters on the interior side, and 3.6 meters on the exterior side. (2)

h) 2.1.1 Bottom tension wires and ground anchors will be PROVIDED to prevent being able to lift the fence fabric more than 5 cm above the ground. (2)

GUIDANCE

REQUIREMENTS

i) 2.1.4 Sufficient gates of equal security provided by the fence shall be PROVIDED to allow access to the site at guarded checkpoints. (2)

j) 2.1.6 Measures adequate to cause a vehicle approaching the gate to slow down or stop shall be PROVIDED at each vehicle entrance. (2)

k) 2.1.7 Separate internal security fences to encircle Class V (ammunition) storage areas shall be PROVIDED. (2)

CRITERIA

i) 2.1.5 Gates will be either manually operated, hinged single leaf personnel gates, turnstile gates, or manually operated sliding gates. When installed and closed, personnel gates will be a minimum of 2.0 m high and the bottom will be as close as possible to the ground or pavement, but not higher than 12 cm. (2)

j) 2.1.6 A simple manually operated metal barrier extending across the road, with counterweight, and or other cost effective solutions will be acceptable.(2)

k) 2.1.7 This fence shall contain double outriggers, barbed tape, lighting and an IDA System. (2)

GUIDANCE

NOTES

DI 27

SS-1

PERIMETER SECURITY AND SENTRY POST

function/purpose

Sentry post and perimeter fencing to restrict unauthorized access, identify personnel, and restrict site vulnerability.

issues and assumptions

activities	personnel	equipment
1. Guarding at gate.		1. Door signal panel.
2. Perimeter surveillance and building security.		
3. Interior surveillance (vehicle or walking surveillance with communication capability).		
1. Obscure facilities.		1. Smoke generators.

requirements

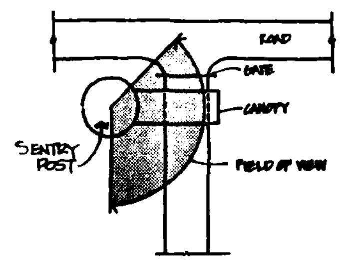
1. Adequate office space.
2. Perimeter fencing.
3. Entry/exit gates and issue/REFORGER access.
4. Illumination (interior and exterior).
5. Power.
6. Door signal panel at guard station to indicate openings during non-use periods.
7. Communication.
8. Environmental control.
9. Covered area at sentry post.

criteria

1. 80 to 90 sq. ft. per person.
2. 8-ft.-high, chain-link with 3-strand barbed-wire (from user).
3. Minimum 30-ft. opening.
4. 600 lux interior. Exterior illumination level will comply with security control points handling vehicles and pedestrians.
5. Minimum of one duplex receptacle per wall. Coordinate additional requirements with the using service.
6. (See Guidance.)
7. Telephone (possible radio contact with remote vehicles required also).
8. 20°C.
9. (See Guidance.)

guidance

1. Good view of approaching pedestrian and vehicular traffic.



Camouflage facility types:

a. Underground locations.

b. Multiple use of similar facility types.

c. Spread-out.

DI 27

SS-2

INTERNAL SECURITY AND TOE PARKING

function/purpose

Internal security of operations and equipment relative to STORAGE and MAINTENANCE functional areas, including parking areas for tactical vehicles awaiting maintenance and preservation work, and quality control checks after work is completed.

issues and assumptions

1. A stormwater collection treatment system will:

   a. Provide compliance with discharge standards required by regulatory agencies.

   b. Require numerous treatment systems.

2. Covered parking areas will:

   a. Prevent stormwater contamination by POL products and solids from the parking surface.

   b. Minimize pollution control costs associated with collection and treatment of stormwater.

   c. Provide protection from the elements to personnel working in the parking area.

3. Maintenance Hardstands.

For 12 & 20 bay facilities, the area of the building is subtracted from the amount of hardstand surrounding the building to give the required area. The hardstand extends 15 meters on all sides of the building.

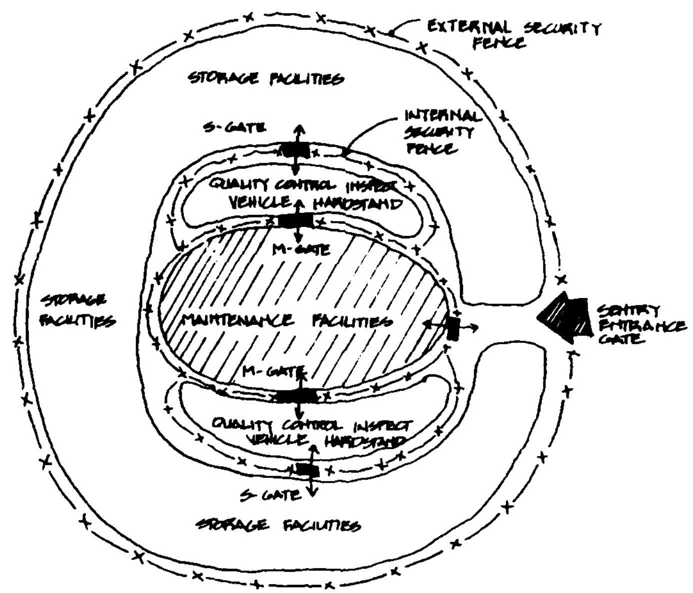
For smaller facilities, such as 4000 SF & 6000 SF, the hardstand extends 10 meters on all sides of the building. To give the required area, subtract the area of the building from the total area (including the hardstand).

For example: if the building is 120m x 70m. The total area is
(120 + 10 + 10) x (70 + 10 + 10),
therefore, (140x90)-(120x70)=12,600-8400=4200m^2 hardstand required.

activities	personnel	equipment
1. Parking of tactical vehicles awaiting work or quality checks. 2. Movement of vehicles between secure areas.	Various maintenance and storage personnel.	

requirements	criteria
1. Internal fencing.	1. 8-ft.-high chain-link.
2. Entry/exit gates between site areas.	2. Minimum 15-ft. opening (see Guidance sketch).
3. Surface to withstand track vehicle usage if appropriate.	3. -
4. Adequate lighting.	4. -
5. Sloped surface to drainage system.	5. Slopes should be no greater than 2 percent.
6. Adequate area for organizational vehicle parking and internal circulation.	6. HARDSTAND REQUIREMENTS FOR VEHICLE MAINTENANCE SHOPS. The following is current criteria being used for evaluation of hardstand requirements for organizational vehicle parking (incl access lanes) for the completion of DD Forms 1391 for FY82: - 75 sq yds per vehicle if majority of vehicles exceed 117 sq ft in actual size (not size of parking space). - 50 sq yds per vehicle if majority of vehicles are 117 sq ft or less in actual size. - 330 sq yds per vehicle for POL trucks. (AEAEN-IC/2121-7198)

guidance



SECURITY FENCING SCHEMATIC

M-GATE - MAINTENANCE GROUP CONTROL
S-GATE - STORAGE/SUPPLY GROUP CONTROL
-x-x-x- EXTERNAL AND INTERNAL FENCING

NOTES

Literature Information

Heating Plant 28.2

User Information

(None Available)

PURPOSE

ISSUES and ASSUMPTIONS

a) 12.1 Heating needs for Type II Forward Storage Sites (FSTS) will be satisfied by either small heating plants for individual buildings or by a centralized heating plant. Whichever proves to be the most economical will be PROVIDED. (2)

b) 12.3 Any pollution controls required on stack emissions or process waters will be reviewed on a case-by-case basis relative to statutory requirements of the host nation. (2)

REQUIREMENTS

a) 12.1 Heating needs for Type II Forward Storage Sites (FSTS) will be PROVIDED. (2)

b) 12.2 All buildings where personnel are working regularly must be heated. Temperature requirements have been discussed in other sections of these criteria. (2)

CRITERIA

GUIDANCE

NOTES

Heliport - 21st SUPCOM is developing facility information for heliport to be available approximately January 1980.

AD-A093 672 CONSTRUCTION ENGINEERING RESEARCH LAB (ARMY) CHAMPAIGN IL F/6 15/5
TYPE II FORWARD STORAGE SITE FACILITIES: POMCUS SYSTEM. VOLUME --ETC(U)
SEP 80 R L PORTER
UNCLASSIFIED CERL-TR-P-112-VOL-2 NL

5 OF 6
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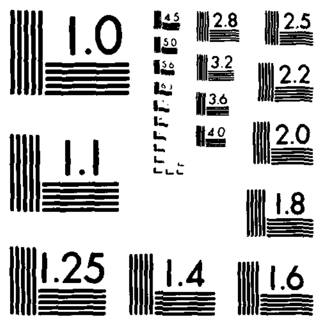

MICROCOPY RESOLUTION TEST CHART

NOTES

Transportation Administration

NOTES

Motor Pool

NOTES

Facility Engineer Shops

NOTES

Quarters

Facilities are dependent upon getting a military personnel complement assigned rather than local nationals.

NOTES

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NOTES

Site Facilities and Utilities

Literature Information

Site Development 29.2

User Information

(None Available)

PURPOSE

1.1 Type II Forward Storage Sites (FSTS) require a variety of functions to support the maintenance, storage, and operational requirements of the site. (2)

7.1 Roads, hardstands, parking, aprons and turning pads will be PROVIDED within the site to assure adequate facilities for proper site operation. (2)

ISSUES and ASSUMPTIONS

a) 1.1 Depending on the scope of a particular Type II Forward Storage Site (FSTS), or the limitations of the locality, several functions may be combined into a single structure. Standard buildings and standard plans should be developed and utilized as far as possible. In many cases, building of the pre-engineered type will be found to be most economical. Building designs which are presently being implemented were developed with this in mind. The quality of this type of building for the functional requirements of Type II Forward Storage Sites (FSTS) is highly acceptable. (2)

b) 6.3 Sewerage and Storm water drainage facilities will be made available on the most economical basis. Those portions inside the boundary of the site, including treatment facilities, if necessary, will be PROVIDED. If it is more economical to connect to a system outside the site, the portion outside the site boundary will be REQUIRED. (2)

c) 5.1.1 FIRE FIGHTING. Water requirements for fire protection purposes will vary with the type of storage facility, type of construction, and other local conditions. If adequate water and hydrants are not available, then a water system with cisterns of adequate size and location will be PROVIDED. (2)

d) 1.9 All pollution abatement and control equipment, such as POL separators and dust filters will be considered on a case-by-case basis, considering the statutory requirements of the respective host nation. (2)

e) 7.2.3 Facilities shall be sited so as to minimize the roadway network required. (2)

REQUIREMENTS

a) 6.1 Grading and erosion control for all areas disturbed by the construction shall be PROVIDED. (2)

b) 6.2 Existing tree cover will be left in place as far as possible to provide tactical cover and to minimize disturbance of the existing site. Cutting of trees, as necessary for the development of the site, shall be PROVIDED. (2)

c) 8.1 The general layout is to be adapted to the landscape. Existing vegetation is to be conserved to the maximum extent possible. Planting of earth covered Class V storage magazines with grass and/or indigenous plants will be PROVIDED. (2)

CRITERIA

c) 8.1 All above-ground buildings will be PROVIDED a matte finish waterproof paint of colour blending with surroundings. (2)

GUIDANCE

REQUIREMENTS

d) 7.2.1 Roads within the site provide access to the various maintenance and storage facilities and to the vehicles in IFBS storage. An adequate road system will be PROVIDED for both the normal operational function of the site and for accomplishment of the tactical mission. (2)

e) 7.1 A two-way access road from the public highway system to the boundary of the project site is REQUIRED to each vehicle access. (2)

CRITERIA

d) 7.2.2 Roads which provide access to the various maintenance and administration facilities and storage areas shall be two way. Roads within hardstand areas used for IFBS storage shall be one way. (2)

d) 7.2.1 All roads shall be of flexible pavement construction, to provide facilities of the least first cost and with a minimum of disruption to the existing natural system. (2)

d) 7.2.2 All two-way roads will be eight and one half (8.5) meters wide and one-way roads will be four (4.0) meters wide. A stabilized shoulder will be provided for each road, .5 meters wide on each side. (2)

d) 7.1 Pavements will be designed for 5-metric ton wheel loads, 60-ton tracked vehicles, and frost. (2)

GUIDANCE

1. With a .5M stabilized.

REQUIREMENTS

f) 7.4 Parking Areas for POV's administrative and visiting vehicles shall be PROVIDED. (2)

g) 7.3 Hardstands and Parking Pads shall be PROVIDED for parking of vehicles in IFBS. (2)

h) 7.5.1 Illuminated access aprons, one per door of magazines and bunkers, and all storage buildings as well as illuminated concrete aprons (tracked vehicles) around the Maintenance Facility, Trades Building, Wash Racks, Grease Racks, and Mech Preservation Facility shall be of sufficient size to permit turning and backing of larger vehicles. (2)

i) 7.6.1 Turning pads for tracked vehicles will be PROVIDED at all locations where there is a turning angle exceeding 45°. This will prevent destruction of the road at these points and minimize restoration work. (2)

CRITERIA

f) 7.4 The parking areas will be of asphaltic concrete construction. (2)

f) 7.4 Thirty-Five (35) square meters of space shall be PROVIDED for each vehicle. (2)

g) 7.3 HARDSTANDS will be constructed of rigid pavement to accomodate tracked vehicles. (2)

h) 7.5.2 All aprons will be of rigid pavement except around Class V magazines and bunkers. (2)

i) 7.6.2 All turning pads will be of rigid pavement construction. (2)

GUIDANCE

7.1 Flexible pavements will consist of interlocking concrete blocks over a sand course over a crushed aggregate base course and a gravel subbase course. Rigid pavements will consist of reinforced concrete over a gravel base. (2)
9.5 Necessary cables shall be underground where practical. (2)

REQUIREMENTS

j) 3.4 All maintenance, storage, guard buildings and entrances to the site perimeter fence will be PROVIDED with lighting controlled by local switching. (2)

k) 3.1 Primary electrical power is REQUIRED and should be supplied to the site from the nearest commercial source. (2)

CRITERIA

j) 3.5 The lighting system shall provide minimum illumination intensities as follows: (2)

3.5.1 100 lux inside warehouses and storage buildings, measured at floor level. (2)

3.5.2 250 lux inside of all maintenance, guard and administration facilities. (2)

3.5.3 5 lux outside of all storage and administrative buildings at midpoint of lower edge of each door only, around the perimeter of open storage areas for routine security and personnel safety purposes, at entrances through the fence, and around Class V storage. (2)

k) 1.14 In addition to the European 220 V/50 Hz duplex outlets, all buildings and storage areas shall be provided with 110 V outlets for the use of US standard issue small power tools. The receptacles for 110 volt shall be the US flat prong type. (2)

GUIDANCE

REQUIREMENTS

l) 3.2 Power distribution within the site shall be PROVIDED. (2)

m) 3.3 Transformer stations shall be PROVIDED as needed. (2)

n) 3.6 Emergency power will be PROVIDED which consists of a stand-by generator with sufficient capacity to provide electrical power for functions effecting security and communications and with the capability of automatic starting and assuming the required load when the primary power is interrupted. A battery power system capable of automatically providing adequate power to operate the intrusion detection system and intercommunications system for a period of 4 hours when the primary power is interrupted, is REQUIRED. (2)

o) 4.1 Lightning protection for all buildings, magazines, and bunkers will be PROVIDED. (2)

CRITERIA

o) 4.1 Lightning protection shall have a maximum grounding of 10 ohms. (2)

GUIDANCE

REQUIREMENTS

p) 5.1 A water distribution system within the site will be PROVIDED to satisfy fire protection requirements, domestic usage, and all maintenance or production requirements. (2)

q) 5.1.1 The distribution system will be based on a rate of flow for each building, warehouse, or open storage area at not less than 1,000 liters per minute, for two hours, from each of two independently located fire hydrants. (2)

r) 5.1.1 Adequate covered storage space will be PROVIDED for fire fighting equipment. (2)

s) 9.1 Telephone communications lines are REQUIRED up to the boundary of the project site. (2)

t) 9.2 Communications facilities shall be PROVIDED within the site to interconnect all administrative, maintenance, storage and security facilities. (2)

CRITERIA

p) 5.1.1 Two fire hydrants will be PROVIDED within 100 meters of each facility protected. (2)

GUIDANCE

NOTES

NOTES

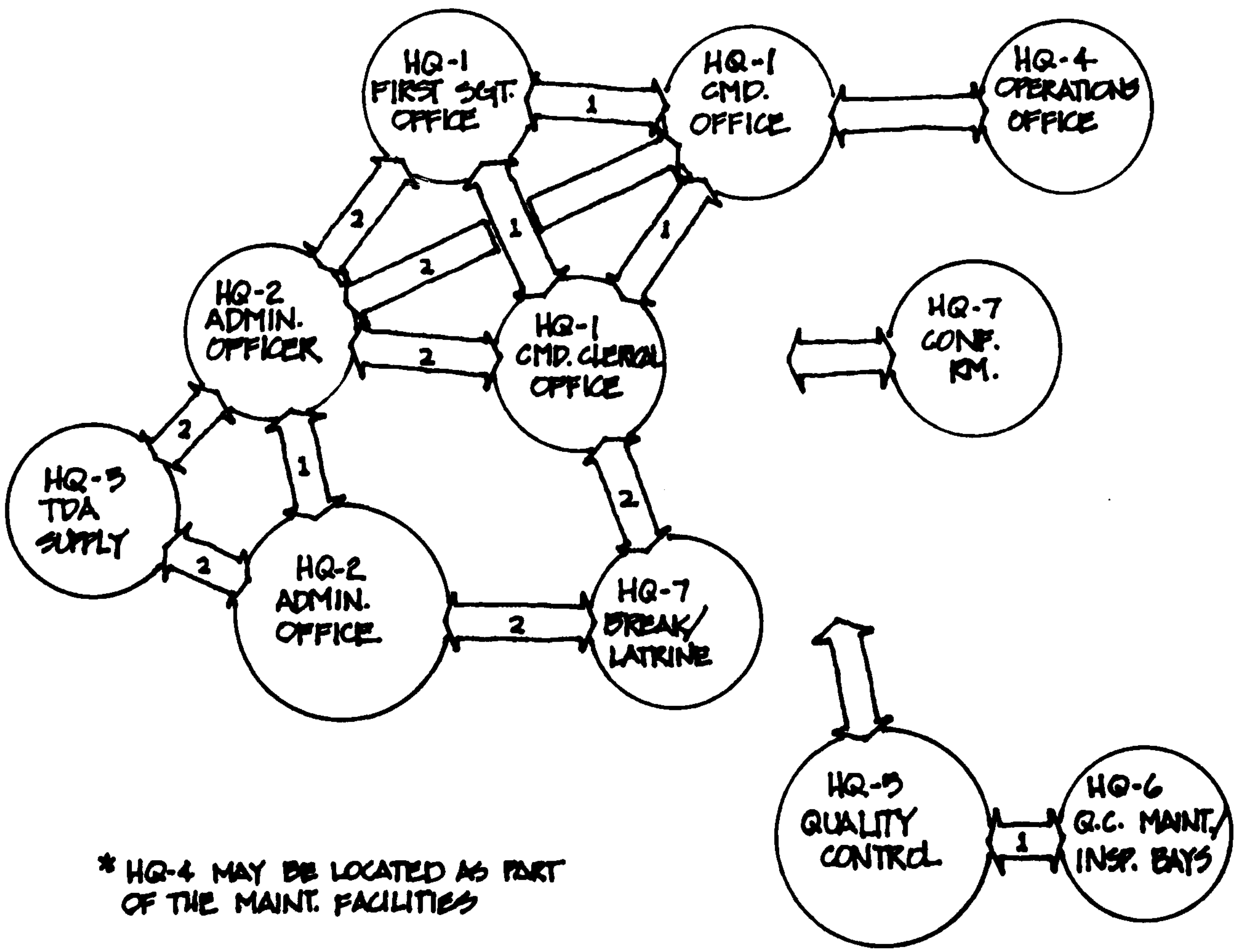
Literature Information

Administration Facility		40.2

User Information

HQ-1	CEC Command	40.6
HQ-2	CEC Administration	40.8
HQ-3	CEC Administrative/TDA Supply	40.10
HQ-4	CEC Operations	40.12
HQ-5	CEC Quality Control (QC)	40.14
HQ-6	CEC QC Maintenance Inspection Bays	40.16
HQ-7	Break Area/Latrine/Locker	40.18

Facility Layout Concept



PURPOSE

10.1 Facilities will be PROVIDED for office space and data processing equipment for day-to-day operation of the site. This will include site administration, regulation of the shipping and receiving function, inventory control, supply procurement, and other functions. (2)

ISSUES and ASSUMPTIONS

a) 10.1 Detailed planning and size of these facilities will be based on mission requirements and size will be specifically justified in each case. (2)

b) 10.2 This parking area is essential as most Type II Forward Storage Sites (FSTS) will be located in fairly remote areas where public transportation is not readily available. (2)

c) 5.2 If the primary water supply required to satisfy the above demand is inadequate, or is not available, ground level storage points or open tanks will be PROVIDED. (2)

REQUIREMENTS

a) 10.3 The facility shall be PROVIDED with areas for customer and visitor reception, offices, storage areas for office supplies, reproduction facilities, offices for the site coordinator, conference rooms, and other specialized office areas which may be needed. (2)

b) 10.2 Special parking areas shall be marked off and set aside for executive and visitor parking. (2)

c) 10.4 The facility shall be PROVIDED with toilets, adequate ventilation, but not air-conditioning, (except in computer rooms for ADP equipment), and lighting and heating facilities compatible with the function of the building. (2)

d) 10.5 To permit changes in policy and methods, interior walls shall consist of movable partitions, which shall be PROVIDED.

e) 10.7 Building shall be PROVIDED with air-conditioned room and a raised floor system for ADP equipment, if such equipment is essential to the operation of Type II Forward Storage Sites (FSTS) facilities. ADP equipment and all specialized installation or tie lines are REQUIRED. (2)

CRITERIA

a) 10.6 Facility shall be designed with a gross interior area of 11.5 sq m per occupant. (2)

a) 10.8 Non-movable walls shall be non-combustible and smooth painted surface and office ceilings shall be non-combustible acoustical tile. Other ceilings shall be plaster or drywall. (2)

GUIDANCE

REQUIREMENTS

f) 3.5 The lighting system shall provide minimum illumination intensities as follows: (2)

g) 1.4 Offices and shops not having natural ventilation will have mechanical ventilation. (2)

h) 9.3 Internal communications will be PROVIDED for one standard manual switchboard to accommodate a necessary number of lines, one terminal equipment and necessary cabling installed in the operations and guard building. (2)

i) 5.1.2 DOMESTIC USAGE. A water distribution system for domestic and industrial usage will be PROVIDED ensuring an adequate rate of flow to all guard and administrative buildings, and to all maintenance facilities. (2)

CRITERIA

f) 3.5.2 250 lux inside of all maintenance, guard and administration facilities. (2)

f) 3.5.3 5 lux outside of all storage and administrative buildings at midpoint of lower edge of each door. (2)

g) 1.4 Mechanical ventilation will provide 10 air changes per hour, unless otherwise noted. (2)

GUIDANCE

NOTES

DI 40

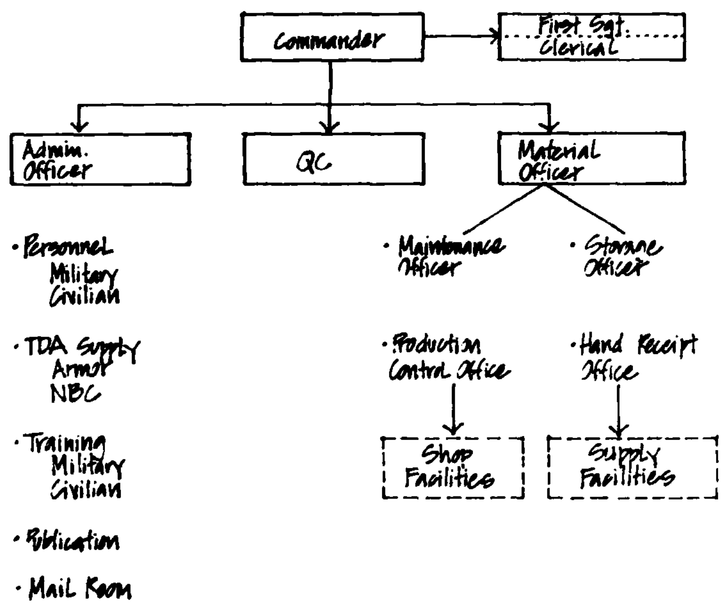
HQ-1
CEC COMMAND

function/purpose

To provide control of the POMCUS facility.

issues and assumptions

1. The facility requirements are based on the assumption of the command being structured as follows:



activities	personnel	equipment
1. Guidance and directives for the entire operation.	1 - military (Major).	1. Desk with chair. 2. Side chairs for 6. 3. 12 lin. ft. of bookcase. 4. Intercom.
	2 - military (First Sgt.).	1. Desk with chair. 2. Side chairs for 6. 3. 12 lin. ft. of bookcase. 4. Chalkboard.
	3 - Clerical.	1. Desk with chairs and typing arm. 2. Typewriter. 3. Side chair. 4. Reception seating for 4. 5. 1 5-drawer file. 6. 12 lin. ft. of bookcase. 7. Intercom.
2. Conferences/meetings.	Up to 20 maximum.	1. Conference table for 15. 2. Seating for 20. 3. AV equipment. 4. Chalkboard and tack surface. 5. Storage cabinet (24 in. x 48 in. x 60 in. high).

requirements

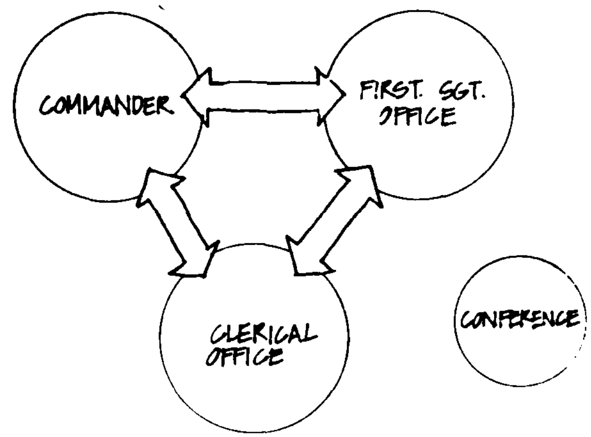
1. Adequate space.
2. Power.
3. Lighting.
4. Temperature and ventilation.
5. Communication.
6. Carpeting.

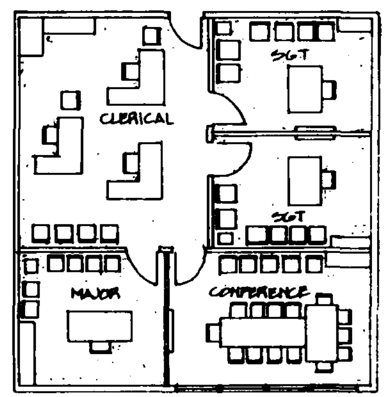
criteria

1. a. CMD - 180 sq. ft.
   b. 1st Sgt - 125 sf.
   c. Clerk - 60 to 90 sq. ft./person
   d. Conference - 225 sq. ft.
2. 110V duplex outlets in wall or in floor boxes.
3. 500 lux with fluorescent fixtures.
4. 20^{0}C during winter and 10 air changes per hour.
5. Coordinate with installation needs; usually telephone, intercom, and sliding window.
6. -

guidance

Commander must have both visual and verbal communications with clerical space (possibly through use of sliding window). The First Sergeant must be adjacent to clerical space and close to the Commander's space. Conference/meeting area should be close to all spaces.





DI 40

HQ-2
CEC ADMINISTRATION

function/purpose

To administer the operation of the POMCUS installation.

issues and assumptions

activities	personnel	equipment
1. Administrative officer.	1 - military (Captain).	1. Desk with chair. 2. 2 side chairs. 3. 12 lin. ft. of bookcase. * Telephone at all workstations.
2. Personnel administration.	1 - military (E-6). 2 - civilians.	1. 4 workstations in larger space.
3. Facilities management.	1 - (either military or civilian).	1. 1 workstation in larger space.
4. Training.	1 - military (Sgt.) E-7.	1. 1 workstation in larger space. 2. 1 side chair.
5. Publications/General Procurement/Word Processing.	1 - military (clerical). 1 - civilian (clerical). 1 - civilian (draftsman).	1. 3 workstations in larger space.
6. Organization Maintenance.	1 - military (Sgt.). 1 - civilian (clerk).	1. 2 workstations in larger space.
7. U.S. Mail distribution.	1 - clerk/driver.	1. 1 workstation.

requirements

1. Adequate space.
2. Power.
3. Lighting.
4. Temperature and ventilation.
5. Communication.

criteria

1a. Admin. off. - 80 to 90 sq. ft. per person with additional space for equipment and files.
   1b. Personnel admin.*
   1c. Facilities mgmt.*
   1d. Training.*
   1e. Publications, gen. procur, WPC.*
   1f. Org. Maint.*
   1g. U.S. mail room - 90 sq. ft. for workstation and 70 sq. ft. for filing, storing, and sorting.

2. 110V duplex outlets at each 10 ft. of wall.

3. 500 lux with fluorescent fixtures.

4. $20^{\circ}C$ during winter and 10 air changes per hour.

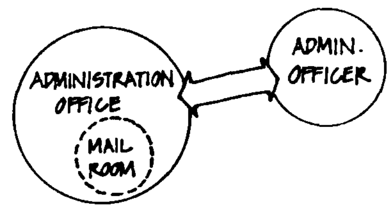
5. Telephone and intercom.

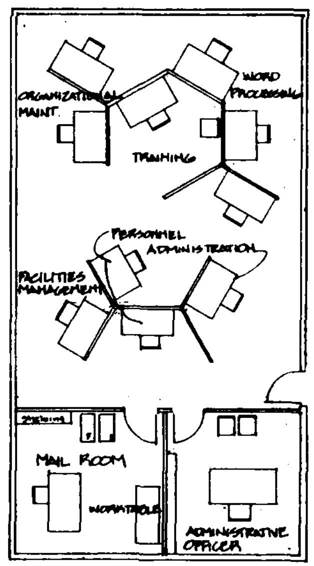
*These areas require 80 to 90 sq. ft. per person, plus additional sq. ft. based on the requirement in each area. A review of space required for training aids, WPC 12 equipment, and publications display should be conditioned.

total area req'd - approx. 1000 sf.

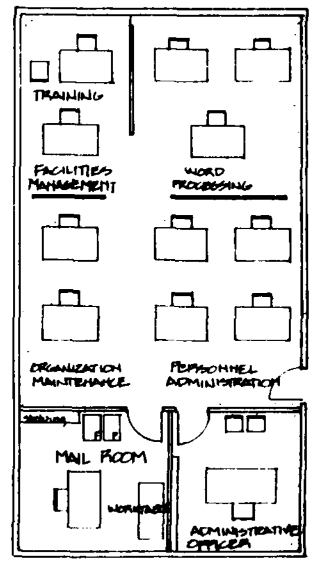
guidance

1. The administrative officer must be adjacent to the main administration office space. The mailroom requires a secure area within the administrative office space.





Alternative One



Alternative Two

DI 40

HQ-3

CEC ADMINISTRATIVE/TDA SUPPLY

function/purpose

To administer the TDA supply operation of the POMCUS facility.

issues and assumptions

activities	personnel	equipment
1. Receiving.	1 - military (E-6). 1 - clerk.	1. 2 workstations in a larger space.
	1 - military (E-4) (armor).	1. 1 workstation in a larger space. 2. 5-drawer file. 3. 4-drawer secure file. 4. 40 lin. ft. of bookcase. 5. 2 - typing stands. 6. Counter.
	1 - driver/ clerk.	1. Doesn't need workstation.
2. Inventory.	Same personnel as above.	Same equipment as above.
3. Storage.	Same personnel as above.	a. Supply room. 1. 1000 sq. ft. shelving. b. Armor room. 1. Unit weapons with rack. 2. Maintenance table. 3. 40 lin. ft. racks. 4. Bayonet locker 24 in. x 36 in. x 60 in. 5. Spare parts approximately 24 in. x 36 in. x 48 in. (on table). 6. Personal weapons cabinet 24 in. x 36 in. x 60 in. c. NBC room. 1. Maintenance table. 2. Hanging racks for protective clothing for 80 personnel. 3. Store cabinet for 4 detector kits that are 24 in. x 36 in. 4. 5-drawer safe file.
4. Issue.	Same personnel as above.	Same equipment as receiving and inventory.

requirements

1. Adequate space.
2. Power.
3. Lighting.
4. Temperature and ventilation.
5. Communication.

criteria

1. a. TDA supply administration - 80-90 sq. ft. per person with additional space for equipment and files.

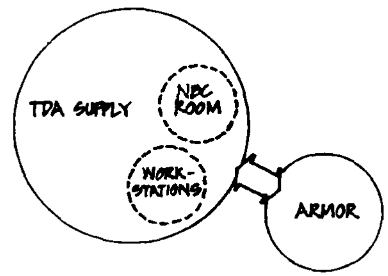
   b. TDA supply room - 1000 sq. ft.

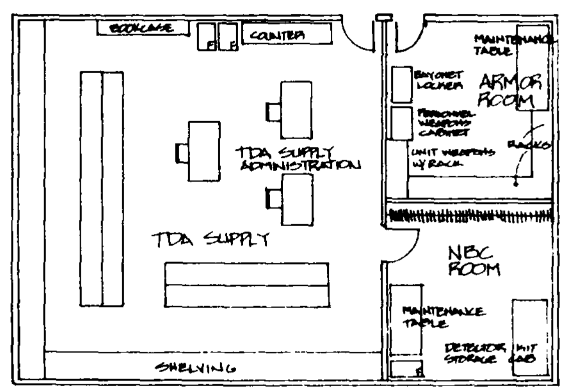
   c. Armor room - 225 sq. ft.

   d. NBC room - 225 sq. ft.
2. 100V duplex outlets each 10 ft. of wall.
3. 500 lux w/fluorescent fixtures.
4. Winter: 20°C and 10 air changes per hour.
5. Telephone and intercom.

guidance

The administration workstations may be part of the TDA supply room. NBC room may also be part of this space although it must be a secure area. The armor room must be adjacent.





DI 40

HQ-4
CEC OPERATIONS

function/purpose

To direct and administer the operations function of the POMCUS facility.

issues and assumptions

activities	personnel	equipment
Operations direction	1 - military (Material Officer-Captain). 1 - civilian (clerical).	1. Desk with chair. Each person. 2. 3 side chairs.
Operations administration MAINTENANCE	1 - military (Maint. W.O.). 1 - military (Maint. NCOIC). 3 - Commodity Mgr. 1 - clerk. 1 - production control. 7 - clerks. 1 - data processing clerk.	15 - workstations in large area. 25 - files. 8 - typewriters for clerks. 6 - 5-drawer files. 6 - visible file indexes. Track/wheel Armor/Commel Engineering preserv.
Operations administration SUPPLY/STORAGE	1 - military (Storage LT). 1 - military (Storage NCOIC). 2 - military (inventory section). 1 - military (driver). 2 - civilians (carpenter-asst.). 1 - military (Hand Receipt WO). 2 - military (drivers). 1 - clerk. 2 - civilian (Hand Receipt Supply Tech.). 2 - civilian (Requisition Supply Tech. Class IX office staff is also a part of this group.	11 - work stations in large area. 2 - interactive terminal stations. 1 - microfiche.

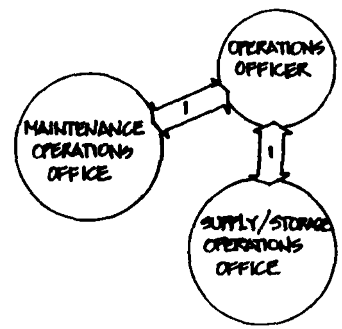
requirements

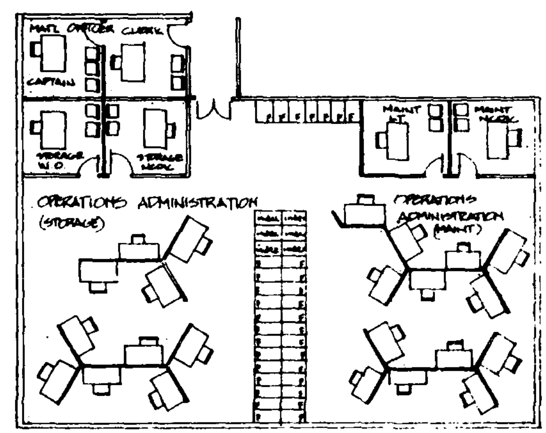
1. Adequate space.
2. Power.
3. Lighting.
4. Temperature and ventilation.
5. Communication.
6. Computer terminals.

criteria

1. a. Operations Director - 80-90 sq. ft. per person with additional space for equipment and files.
   b. Operations Administration - 80-90 sq. ft. per person with additional space for equipment and files.
   c. WOIC, Lt, & W.O. - Separate office w/80-90 sf per person w/ additional space for equipment & files.
2. 110V duplex outlets each 10 ft. of wall.
3. 500 lux w/fluorescent fixtures.
4. Winter: 20°C and 10 air changes per hour.
5. Telephone and intercom.
6. 2 interactive terminal keyboards with display and printer.

guidance





DI 40

HQ-5
CEC QUALITY CONTROL (QC)

function/purpose

To provide for quality, inventory, and supply function checks within the POMCUS facility.

issues and assumptions

activities	personnel	equipment
1. Quality checks.	1 - military (W.O.).	19 - workstations in large areas.
2. Inventory checks.	1 - military (NCOIC/Production Control Insp.).	400 lin. ft. of bookcase.
3. Supply function checks.	1 - clerk.	2 - microfiche.
	3 - Wheel Inspectors (1 - mil. E-7, 2 civilians).	
	3 - Track Inspectors (1 - mil. E-7, 2 civilians).	
	3 - Armament/Turret Insp. (1 - mil. E-7, 2 civilians).	
	3 - Engineer Inspectors (1 - mil. E-7, 2 civilians).	
	1 - Commel Inspector (mil. E-7).	
	1 - Supply Tech. (mil. E-7).	
	1 - Storage Tech. (mil. E-7).	
	1 - Supply Storage Tech. (mil. E-6).	

requirements

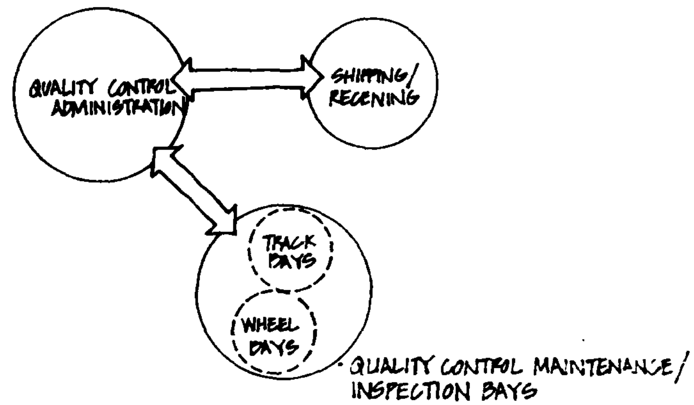
1. Adequate space.
2. Power.
3. Lighting.
4. Temperature and ventilation.
5. Communication, telephone, intercom.

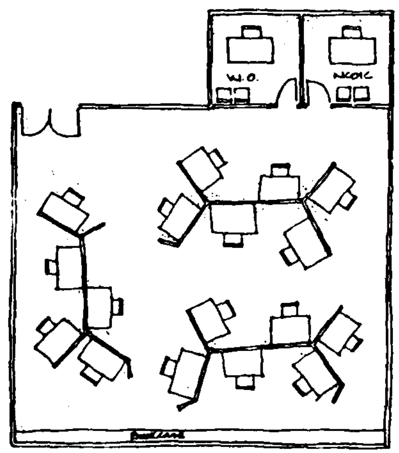
criteria

1. a. 80 to 90 sq. ft. per person, with additional space for equipment and files.
   b. NCOIC, W.O. - separate office w/ 80-90 sf per person with add'l space for equipment and files.
2. 110V duplex outlets at each 10 ft. of wall.
3. 500 lux with fluorescent fixtures.
4. 20° during winter and 10 air changes per year.
5. Telephone and intercom.

guidance

The entire quality control administrative function may be accommodated with workstations located in one large space. However, this large space should be related to both the shipping/receiving facility and to the quality control maintenance/inspection bays.





DI 40

HQ-6
CEC QC MAINTENANCE INSPECTION BAYS

function/purpose

To provide area for quality control inspections.

issues and assumptions

activities	personnel	equipment
Quality control inspections.	Same as Quality Control Office.	2 - bays (track). 2 - bays with inspection pits (wheel). - Workstations in each bay w/tables. 2 - Cabinets for diagnostic equipment (secure). - tool kits. - jacks; portable or fixed. - solid waste storage.

requirements

1. Adequate space - 4 bays: 2 for tracked, 2 with drive-through capability for wheeled.
2. Power.
3. Bay lighting for inspections.
4. Heating and ventilation.
5. Communications.
6. Bay area, one double drive-through with an inspection pit at one end. (1 tracked, 1 wheeled.)
7. Overhead door to outside and personnel door for each bay.
8. Sanitary sewer drain in both bays.
9. Vehicle exhaust system.
10. Non-skid floor surface.
11. Provide light crane in at least one bay to help lift parts being removed or replaced.

criteria

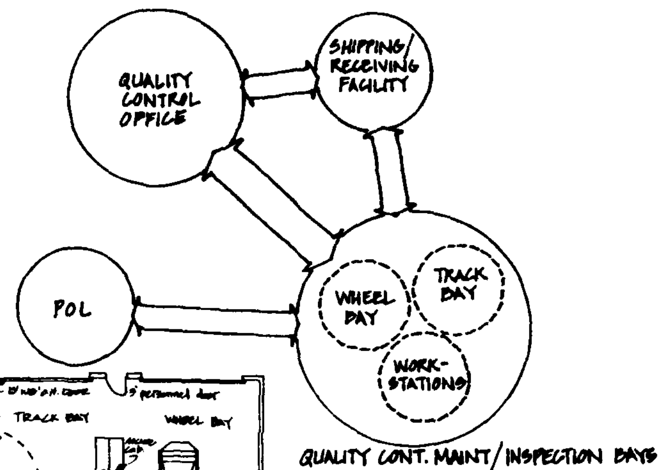
1. a. Track bay - 864 sq. ft.
   b. Wheel bay - 768 sq. ft.
   c. Bay work areas - 100 sq. ft. with table.
2. 110V duplex outlets at each 20 ft. of wall or in pits.
3. 300 lux with fluorescent fixtures.
4. $20^{0}C$ during winter and 10 air changes per hour.
5. Intercom with CEC Commander.
6. See Guidance sketch.
7. Powered overhead door (15 ft. x 18 ft. high). Personnel door (3 ft. x 7 ft.).
10. Concrete slab.
11. 4 metric tons capacity (exact size to be determined for specific project).

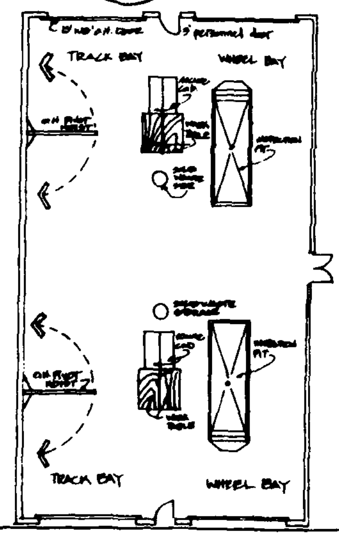
guidance

1. The Quality Control Maint./Insp. Bays should be adjacent to the Quality Control Office and should have access to POL products.

2. Quality Control Office/Maint. Insp. Bays can be a part of the shipping/receiving facility on the POMCUS site.

3. See Tracked Vehicle and Wheeled Vehicle maintenance bay sheets for bay and inspection pit layout guidance, OM sheets.





HQ-7
BREAK AREA/LATRINE/LOCKER

function/purpose

Latrines, Showers, and Locker Rooms for Facility Personnel Use.

Personnel Training and Work Break Activities. A break, training, and conference area should be provided at a central location in the building where persons can assemble for daily work breaks and periodic group training sessions.

issues and assumptions

Toilet facilities shall be provided for men and women:

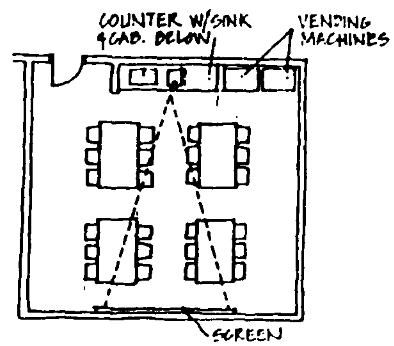
1. Water consumption: In some locations, reducing water consumption is important. On military facilities, the installation of water-saving devices in latrines would reduce the amount of water that is used without affecting the operation of the equipment. This is especially important in geographic areas where water supplies are dwindling; in addition, it reduces water supply costs at all military installations.

2. Flexibility of Break, Training Facilities:

Adequate space (area) for breaks, training, and/or conferences is required. Most facilities have fixed-wall construction on interior walls. Movable walls would allow flexibility in space allocation.

activities	personnel	equipment
1. Washing. 2. Eliminating. 3. Self-grooming. 4. Personal storage.	All the personnel assigned to the facility; visitors.	1. Wash basins/soap holders. 2. Showers. 3. Urinals/water closets. 4. Mirrors. 5. Paper towel holders. 6. Lockers, benches. 7. Wastebaskets.
1. Training classes. 2. Breaks. 3. Conferences.	Could include all personnel working in the building, probably in groups of 20 percent of assigned maximum.	1. Tables with side chairs. 2. Vending machines. 3. Drinking fountain.

requirements	criteria	guidance
1. Illumination. 2. Power. 3. Plumbing fixtures. 4. Temperature. 5. Adequate ventilation. 6. Adequate size.	1. 250 lux. 2. 110V at least 24 in. above finished floor; (one 20A duplex/wall). 3. Provide water closets, urinals, and wash basins. Install water-saving devices in water closets, faucets, and showers. 4. $20^{\circ}C$ during winter. 5. 4 air changes per hour. 6. Space allocation. A minimum size should be determined and specified based on number.	1. Use fluorescent fixtures for lighting. 2. Latrines should be centrally located and accessible from exterior and interior work areas. 3. Latrines should be provided in each inhabited building within a complex. 4. Latrines should be located in the parts of the building constructed as shop or office space. There are a number of different types of water-saving devices produced by commercial manufacturers that can be installed in water closets, faucets, and showers. 5. See OM-16 sheets for typical plan layouts.
1. Adequate size. 2. Smoking area ventilation (must be physically separated from vehicle bays). 3. Power. 4. Water sources for drinking fountain and coffee machines. 5. Illumination. 6. Co unication. 7. AV screen.	1. A minimum size should be determined and specified. 2. Ventilation - 10 air changes per hour. 3. Provide one 120V-20A duplex receptacle for each vending machine. Minimum of one on each wall. 4. - 5. 500-lux, fluorescent ceiling fixtures, with one fixture at rear of space switched separately for minimum light level for AV presentations. 6. One wall telephone. 7. 8-ft. x 8-ft. pulldown screen.	1. Example: A room 24 ft. x 24 ft. (or 575 sq. ft.) will provide adequate space for tables and chairs, plus some standing room or space for vending machines and adequate distance for AV presentations. 2. The use of second-floor space for office area, conference rooms, etc. would release area on the ground floor for other activities.



TYPICAL BREAK/TRNG ROOM

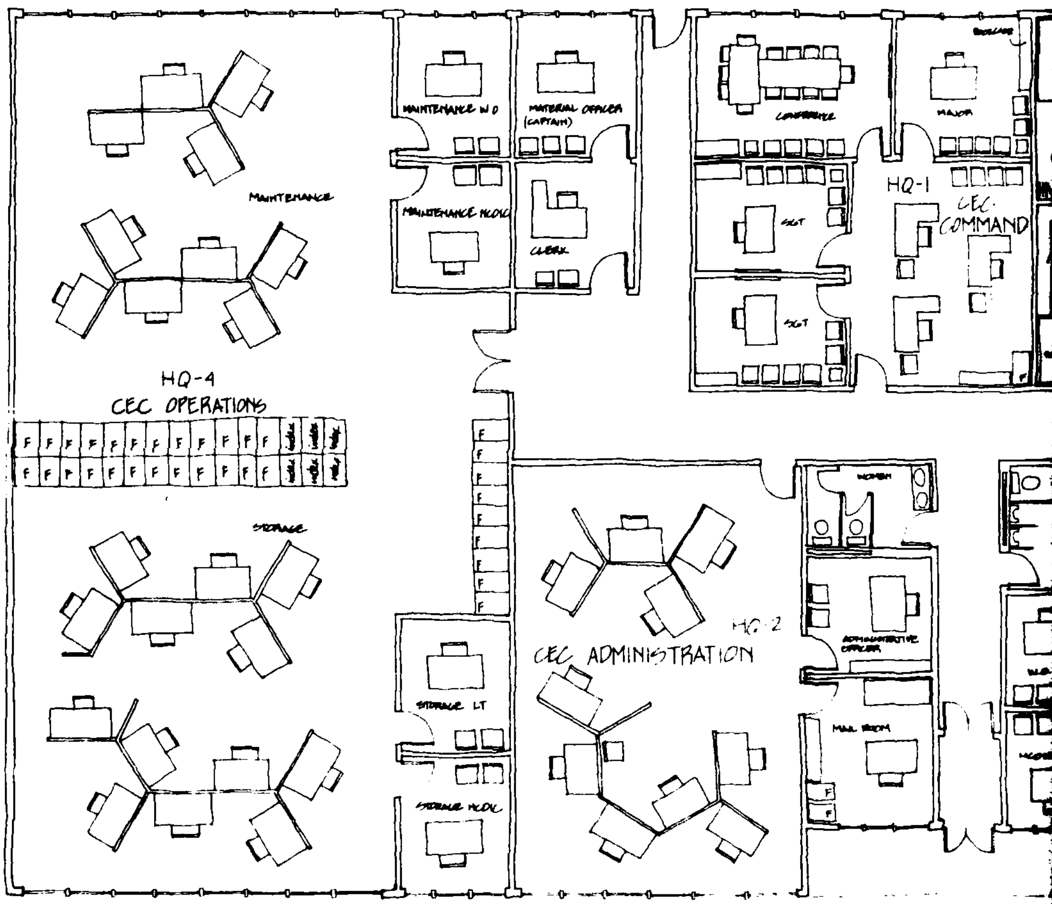
NOTES

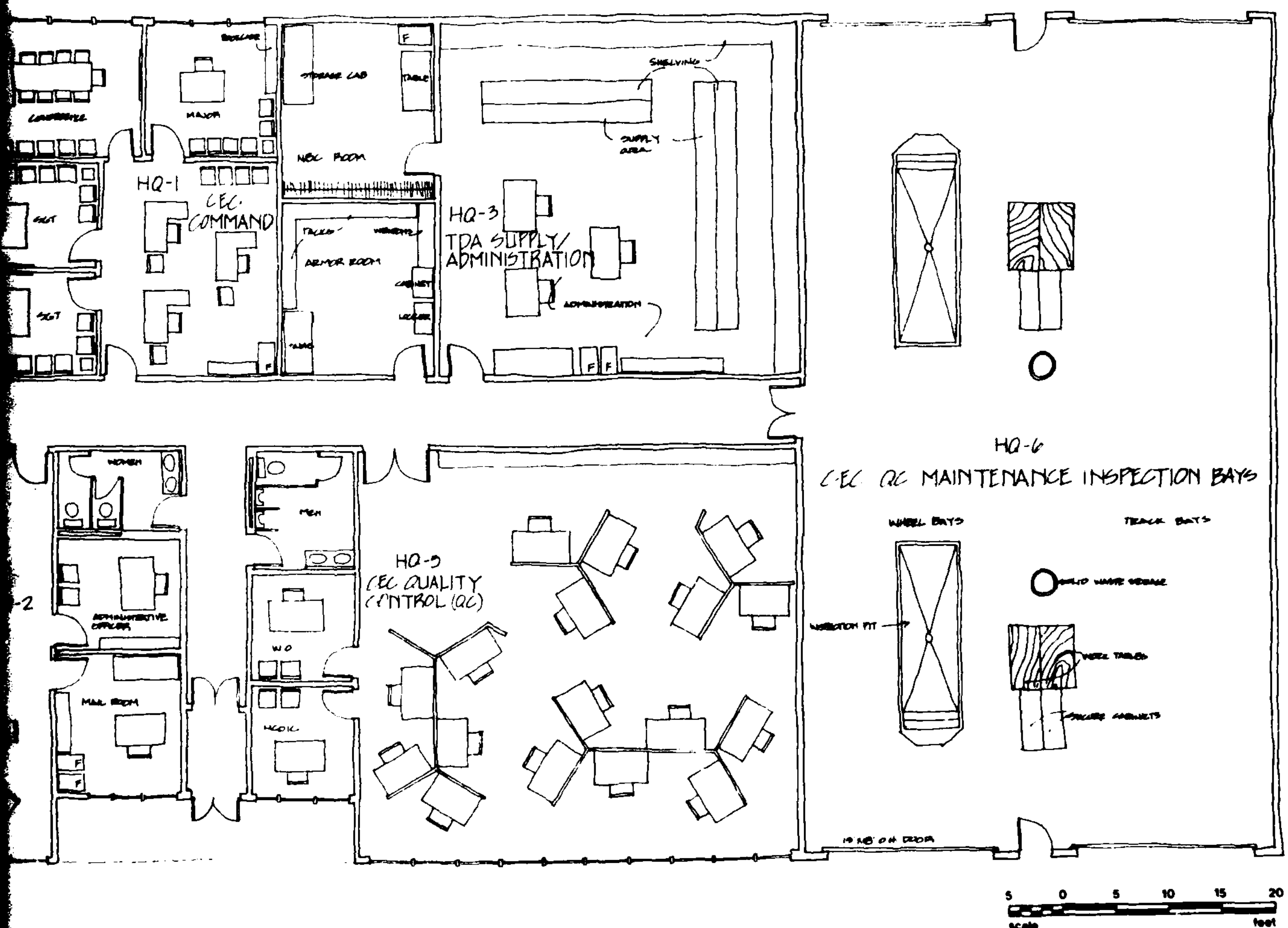
Communications

NOTES

Facility Layout Concept

CEC Headquarters




HQ-1
CEC COMMAND
MAJOR
NBC ROOM
ARMOR ROOM
STORAGE CAB
SHELVING
SUPPLY AREA
HQ-3
TDA SUPPLY/ ADMINISTRATION
WOMEN
MEN
ADMINISTRATIVE OFFICER
MAIL ROOM
W O
HQ-5
CEC QUALITY CONTROL (QC)
HQ-6
CEC QC MAINTENANCE INSPECTION BAYS
WHEEL BAYS
TRACK BAYS
INSPECTION PIT
WORK TABLES
SECURE CABINETS
5 0 5 10 15 20
scale
feet

Literature Information

Site Development	45.2
Facility Relationships	45.4
ANNEX A	45.7
ANNEX B	45.8

User Information

Interview Comments LTC G. Brauch Jr. Commander, CE Battalion East-May 1979	45.10

PURPOSE

ISSUES and ASSUMPTIONS

a. Methods:
A combination of storage methods are being planned for use; warehouse storage for non-vehicular crew-served weapons, generators, radios and non-mechanized equipment. Flexible Barrier Shelters (FBS) for vehicles (as interim storage method until NATO funded CHW's become available--then the FBS will be used for theater reserve stocks, now in open storage). (5)

b. Management:
The preferred system for management of POMCUS is through a Host Nation service contract. Utilizing this system, the Host Nation would operate the POMCUS facility to include:
1) receiving,
2) maintaining, and
3) assisting in Issue of equipment.
A significant difference exists between the number of personnel in present CEGE and that planned. The present CEGE has approximately 500 military, and 1800 local national civilians. The proposed CEGE for the NORTHAG POMCUS would have a total of 91 military and 5221* local national civilians (for the combined sites). The disparity between the size of the present and proprosed CEGE is caused by:
1) The large number of units,
2) increased labor requirements of FBS compared to CHW, and
3) the expanded function of CEGE to perform direct support maintence....(5)

REQUIREMENTS

CRITERIA

GUIDANCE

Ref.
TRADOC: FM 100-5 "U.S. Army Doctrine for Modern Combat," has "Operations within NATO" section, that should be further developed into training films, handbooks, etc. (5)

PURPOSE

To facilitate the quick deployment of CONUS ground forces with prepositioned equipment at CEGE storage facilities. (4)

ISSUES and ASSUMPTIONS

a. POMCUS is stored in battalion sets, and that is the way it will be withdrawn. (4)

b. They move from their POMCUS sites to their initial unit assembly area (IUAA) and pick up their fuel, ammunition, and medical supplies using their prepositioned vehicles. (4)

c. ISSUE: to standardize the equipment of similar battalions in CONUS and their POMCUS stocks in the FRG. This would ensure that units required to draw POMCUS stocks from alternate sites are adequately equipped. (4)

d. ISSUE: CONUS units need simulated training on withdrawing their stocks from POMCUS sites. Training areas at CONUS bases can be laid out to duplicate the units actual POMCUS site.... (4)

e. The status of POMCUS changes (daily). Changes in the units to move, in the airlift situation, and in the details for reception are constantly in a state of flux. (4)

REQUIREMENTS

CRITERIA

GUIDANCE

6.1 Selection of sites will be governed by tactical operation considerations. (2)

6.2 Site selection should consider local land use restrictions, existing facilities, real property availability schedules, and sufficiency of access routes. (2)

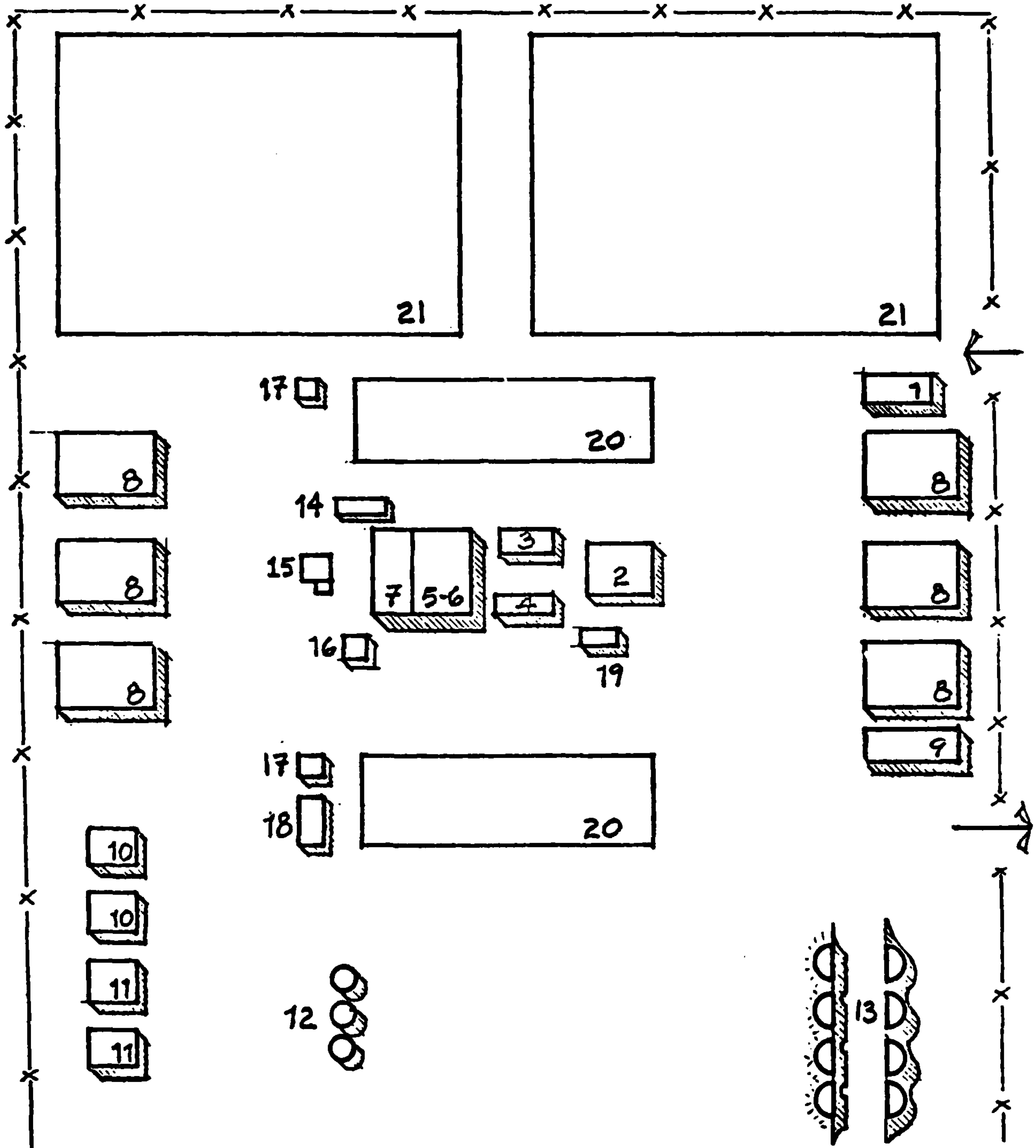
6.3 Terrain features and natural camouflage influence the security of the installation and should be considered.

6.4 Use of existing facilities may be possible and must be carefully considered, both for economic and operational reasons. (2)

6.5 Site layout must insure separation of ammunition, explosives, and mines storage facilities from POL and compressed gas facilities, and all of the above from other types of storage and personnel facilities. (2)

6.6 A schematic diagram of a typical Type II Forward Storage Site (FSTS) is included at Annex A (p 45.7). For internal and external safety distances, established NATO criteria should be observed. (See Annex B, pp 45.8-45.9.) (2)

NOTES



1. Shipping/Receiving Facility
2. Non-Mech/Engrg Maint.
3. Administration Building
4. Armament Maint/Storage
5. Organizational Maint.
6. Mech Preservation
7. Trades Building
8. CH Warehouses
9. Medical Storage Building
10. Class I Storage
11. Class IV Storage
12. Bulk POL Storage
13. Class V/Ammo Storage
14. POL Pump Station
15. Grease/Wash Racks
16. Compressed Gas Storage
17. Packaged POL Storage
18. Battery Activation Fac.
19. Heating Plant
20. Parking/Convoy Assembly
21. Open Storage (IFBS)

ANNEX B

SAFETY DISTANCES

Internal and external minimum safety distances should be in accordance with the following table; however, where host nation regulations require more rigid safety measures, these deviations will be considered on a case-by-case basis.

Serial	From	To	Distance
(a)	(b)	(c)	(d)
1	Operations and Guard Building	Fence	3m.
2	Parking Areas	Fence	3m.
3	Magazines and Bunkers	Fence	35m.
4	Warehouses and Open Storage Areas for Cl I, II, IV, and VIII Supplies	Fence	30m.
5	Magazine or Bunker	Magazine or Bunker	According to NATO document AC/258-D/70, dated December 1969, Subject: NATO SAFETY PRINCIPLES FOR THE STORAGE OF AMMUNITION AND EXPLOSIVES, Tables 1 through 6, pages D-5 through D-15, or any valid future revision.
6	Warehouse or Stocks on Open Storage Areas for Cl I, II, IV, and VIII Supplies	Warehouse or Stocks on Open Storage Area for Cl I, II, IV, and VIII Supplies	20m.
7	Magazines or Bunkers for Cl V	Cl I, II, IV, VIII Storage Facilities	According to NATO document AC/258-D/70, dated December 1969, Subject: NATO SAFETY PRINCIPLES FOR THE STORAGE OF AMMUNITION AND EXPLOSIVES, Tables 1 through 6, pages D-5 through D-15, or any valid future revision. For the application of the tables the warehouses and open storage areas for Cl I, II, IV, and VIII supplies storage should be considered as explosive workshops, light structures, unbarricaded, symbolized in the tables by the letter K.

(a)	(b)	(c)	(d)
8	Magazines or Bunkers for Cl V	Operations and Guard Building	As in Serial number 7.
9	Magazines or Bunkers for Cl V	Parking Area or Helicopter Pad	As in Serial number 7.
10	Magazines or Bunkers for Cl V	POL Storage Facilities (underground)	90m.
11	Class III Storage Facilities	Class I, II, IV, VIII Storage Facilities	80m.
12	Class III Storage Facilities	Operations and Guard Building	80m.
13	Class III Storage Facilities	Parking Area or Helicopter Pad	80m.
14	Magazines or Bunkers for Cl V	Public roads	According to NATO document AC/258-D/70, dated December 1969, Subject: NATO SAFETY PRINCIPLES FOR THE STORAGE OF AMMUNITION AND EXPLOSIVES, Tables 1 through 6, pages D-5 through D-15, or any valid future revision. Public roads are symbolized in the tables by the letter N.
15	Magazines or Bunkers	Inhabited buildings (Operations and Guard Building is not considered as Inhabited Building).	According to NATO document as in Serial number 14, inhabited buildings are symbolized in the tables by the letter O.
16	Cl III Storage Facilities	Public roads	80m.
17	Cl III Storage Facilities	Inhabited buildings	80m.
18	Cl III Storage Facilities	High-tension overhead lines	80m.
19	Cl III Storage Facilities	Flammable Facilities	130m.

INTERVIEW COMMENTS LTC G. BRAUCH JR.
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DESIGN OF A POMCUS
STORAGE SITE*

The following information has been prepared to provide some policy and philosophical considerations for design development of the standard POMCUS Storage Site, otherwise known as CEGE Mark II.

One of the major policy considerations that can drastically affect facility design is whether or not equipment will be uploaded for a particular unit, i.e., requiring all of the nonmechanical and ancillary equipment for a particular organization to be loaded aboard the vehicles assigned to that organization in the controlled-humidity warehouse. This is essentially a "stand-in-the-door" type of storage philosophy and provides the fastest response time for contingency issue.

There are policy and maintenance considerations which make an uploaded storage configuration less desirable from a maintenance, storage, and supply viewpoint. It is difficult to make the necessary changes in the nonmechanical equipment if it is already loaded on trucks; however, storing equipment in an uploaded configuration will reduce the total storage space requirement on any CEGE storage site. But now we have created a requirement for an entirely different facility, one which must be able to unload the vehicle and keep the load together while the vehicle undergoes maintenance, since maintenance cannot be done on a loaded vehicle. Therefore, the load must be removed from the vehicle; then, while the vehicle is being maintained, that load must be cycled through an inventory and reconstitution process.

The facility must allow for the storage in a unit load set, and provide access to it. The facility must be designed so that the load does not lose its integrity, because essentially the same load should be replaced on the truck that was removed from it. This gives us two very different types of facilities driven by whether the equipment will be stored uploaded or downloaded.

If we design for a download capability, we can accommodate the upload requirements, because less storage and processing space is required for uploaded equipment; however, this is not a very efficient design, because there is a great deal of wasted space. In the controlled-humidity warehouse itself, there must be provision for access to uploaded equipment. There is no command and control system that would allow a vehicle to be uploaded and simply left with all that equipment on it while the truck undergoes a 4-year cycle of changes.

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The situation becomes more difficult with vehicles that have closed-in backs, such as maintenance vans and COMMEL shelters, those whose back doors cannot be opened when they are parked nose-to-tail. It is difficult to have access to those loads without moving the vehicle, and this compromises the integrity of the current storage concept. Therefore, uploading creates design problems from standpoints of both access to the loads, and then processing the loads as the equipment moves into the cyclic maintenance facility for updating and upgrading the equipment on that load.

Since the equipment is uploaded, there must be better access inside the controlled-humidity warehouse for handling oversized, overweight, bulky, or heavy items. Adding or deleting small equipment is also inconvenient. For example, if tools must be added to a tool kit or tool set loaded on the back of a truck, it is relatively easy to put these tools into some sort of a small bag or a small box and simply put them up in the back of the truck in any available space, or even in the cab of the truck. However, removing the old items as well as trying to replace bulky or heavy items becomes a problem.

Some sort of an overhead rail system might be necessary to move some of the large boxes, but personnel can't get into the tops of the trucks to fully use an overhead rail system, because the canvas and the bows are stored intact on most of these vehicles. Certainly, if the equipment were uploaded, there would be a requirement to have the canvas and bows mounted on the cargo-bearing vehicles. Therefore, changing to an uploaded configuration is a design dilemma, as well as a challenge. Remember, if equipment is uploaded, there must be access to the warehouse as well as maintenance of individual load integrity in the processing facility for meeting the uploaded requirements.

In terms of a test track, a perimeter road had appeared to be sufficient; however, two additional considerations have become apparent. The first is the need to verify the water-tightness of some of this equipment as a part of its serviceability check, for example, the Gamma-goat. This requires a moderately sized body of water or tank. Also, there is a requirement to check the major weapons system. Therefore, there may be a requirement to incorporate into the design some sort of a sighting range, or in the case of equipment that might have laser range finders, a protected sighting area. The best way to check these unique requirements is to review the serviceability requirements of the major combat pieces. Trucks, jeeps, and generally, armored personnel carriers are not problems, except that their swimming capability may have to be checked. These examples indicate the types of things that should be built into what is loosely referred to as the test track, or more descriptively, the Serviceability Verification Area.

Another maintenance requirement is exercising the recoil mechanisms of the major-caliber weapons (e.g., the M60, M109 Howitzer and the 8-in. gun) every 6 months while they are still in storage. These pieces

currently have a provision for manually exercising the recoil mechanisms; however, future pieces of equipment may not. Essentially, recoil exercising means bringing the gun out of battery to get the fluids and gas interaction within the recoil mechanism working again and allowing it to return to battery. A manual pump can be used, as well as a method that allows backing the boom of the wrecker into the end of a muzzle to push the tube out of battery and then allowing it to return to the battery. Obviously, in storage the manual method that does not move equipment around, is preferable. One consideration in designing storage facilities is insuring that there is enough room for exercising the recoil mechanisms of the major-caliber weapons. This may entail providing sufficient overhead clearance to allow the tube to be fully elevated.

Another major policy consideration is maintaining unit integrity while equipment is in storage. Unit integrity is currently maintained within POMCUS CENTAG to a battalion set level -- mechanized infantry battalion, armor battalion, and maintenance battalion. Some units are stored in company-level sets, but these generally tend to be units that have distinctive company-level TO&Es, and most tend to be support units. The combat units are generally in battalion sets, but in the future, there may be company-level sets for the combat units as well, which may create facility design problems.

There is a vast difference between the amount of equipment in a mechanized infantry battalion and that in a company. That equipment must all be accessible to the doors. However, storage flexibility must not be limited by the facility design. As the units which are to be maintained together become smaller (company size rather than battalion size), it becomes more difficult to store these units so that there is access to all of them. During contingency issues, there is no guarantee of the order in which units will arrive, so the storage area must be designed so that all units are accessible at any time and in any order. This becomes difficult, particularly as the units become small enough so that they may not fill up a whole row, or a row and a half, or a row and a quarter; when there are three units, and each takes one and a quarter rows, it becomes difficult to store them and still avoid having to move one unit to get to another.

Any storable piece of equipment in the POMCUS project should be capable of being stored at any place in any warehouse. This is not possible in some of the places in CENTAG now, so we are constrained to storing only certain types of units in a warehouse, which must not occur, because there is no guarantee thata particular mix of units at a particular site will remain constant over any extended period of time. There is also no guarantee that certain items of equipment will not suddenly show up because of the TAADS change in a UIC that never had it before. For instance, there is no guarantee that M60 tanks might not appear somewhere in the TOE of a mechanized infantry battalion or a mechanized infantry company. Therefore, facility design must not be restricted to accommodate certain equipment, particularly because of the mobility of current TAADS and tactical doctrines. The unit integrity

requirements not only apply to equipment in storage, but also to maintenance. From a control viewpoint, this makes a big difference in how the equipment going through cyclic maintenance is handled, and also may have some effect on the facilities.

There is a vast difference between keeping an armor battalion with its 54 tanks and other pieces of equipment together as it goes through the entire maintenance cycle, and in trying to keep a truck company with its 60 trucks together. It will impact the parking area outside, the staging area for the waiting parts, the nature and type of shops that are built, how many bays are capable of taking tanks, and the number of bays required. These types of factors are all considered in terms of unit size and the amount of unit integrity to be maintained.

Along with the line of unit integrity and the line of flexibility of storage space, restationing along the combined arms team concept is being considered. Planners must insure that a site has sufficient storage and maintenance facilities to allow storage of a combined arms team. For example, a mechanized infantry battalion -- a new battalion -- is now being assigned to a site in Germany; however, this site is the only one in Europe which is not programmed to get a standard armaments facility capable of handling all of the 50-caliber machine guns that go with this mechanized infantry battalion. This was because at the time it was planned, it didn't store a mechanized infantry battalion and therefore did not need a lot of armament storage space. In other words, the planners did not have the foresight to build in a flexibility that would allow for restationing of units.

Current planning revolves around the desirability of putting an entire combined arms team at a site, so that a brigade, for example, would have its headquarters, its combat battalions, and its tailored combat service support all stored at one site, which would enable them to move in together, draw their equipment, and then move out as a fighting team. Currently, that is not necessarily the case; in fact, the brigade headquarters might be at one site, several of its battalions at another, some of the other battalions at a third, and some of its support at a fourth, with all of these sites being 10, 20, 30, and in some cases, 50 kilometers apart. Under these circumstances, it is obviously difficult for a brigade commander to get his fighting units together. Therefore the stationing of a brigade set should probably greatly influence the types of facilities built into an ideal CEGE site. Again, the composition of that brigade might change. There may be a brigade having two mechs and one armored battalion, another having two mechs and two armored, and another having two armored and one mech. Therefore, the designer cannot be tied into a typical Leavenworth-style brigade, although there should be enough facilities to support a brigade at one location at one time. Also, that is approximately the right amount of equipment when some of the supporting units that really don't belong to the brigade and don't belong to the division and corps support units are added.

If those types of supporting units are added, a brigade set plus some of the corps slice is approximately the right size for somebody to be able to manage from a company point of view; that is, it's a manageable amount of equipment, it's large enough to gain on the economies scale, but not so large as to be overpowering for the limited number of people who normally administer and work a POMCUS site on a routine basis.

Of course, the bottom line for any POMCUS organization is not so much efficiency in storage, ease of maintenance, whether the equipment is uploaded, or how the equipment is tested. The ultimate test of a CEGE or POMCUS site is how equipment is issued to make a unit combat-ready in war time, given the pressures and exercises. Ideally, the troops should be delivered directly to the POMCUS site, so the site should be located at or near the arrival airfield. This produces a great deal of congestion because everybody wants to be near the arrival airfield. It is better to have an auxiliary airfield near the POMCUS site, so that secondary airlift rather than intertheatre airlift can deliver the troops to within walking distance of the POMCUS site. For example, Karlsruhe has a C130-capable airfield which is within walking distance of the two issue sites in the Karlsruhe area. The distance is a little far, but it doesn't require land transportation to get the issue team to the site. Granted, this requires coordination of air assets to deliver them, but this might be easier than trying to coordinate land transportation for the more than 200 people who come to the POMCUS site and actually draw the equipment. Therefore, the POMCUS site should be accessible to the means of troop delivery.

There must also be enough area around the POMCUS site for the drawing unit to be able to prepare themselves for battle. Even if there is uploading into company-level sets, equipment must be re-distributed, checked out, and worked over. In addition. "To Accompany Troops" (TAT) equipment must be married up in this marshalling area with equipment that is drawn from POMCUS to complete the battalion set, because there is a certain amount of equipment that is not stored in the POMCUS site which troops bring with them that is combat-essential. So, they must do this marryup, and in addition, the main body must marryup with the equipment and the advance party that drew the equipment. Thus, a fairly large lager area is necessary to be able to hold the unit and its personnel in a tactically dispersed formation as they outfit themselves for war, and this area must be close to the site. In addition, there must be an area in which troops who are waiting to draw their equipment can wait, because there is a strong possibility that two units will arrive close enough together to create a backup. This situation will require an area large enough to accommodate these people temporarily but yet not be on the CEGE site itself, since there cannot be more than one unit on the site at a time. The traffic flow simply will not bear the weight; also, there is a command and control problem that must be considered when mixing units.

It is very important to keep units separated as they attempt to draw equipment from a CEGE site. The battalions involved are not used to drawing equipment from a CEGE, in which the command and control structure must be reorganized. All of the drivers are there, regardless of what company or platoon they are in, the maintenance people are there, and unless the battalion has a consolidated maintenance section, a multitude of maintenance people will literally be stepping all over each other.

In this situation, nobody can match a particular vehicle to a specific subelement of the battalion. For example, normally, personnel can identify an Armor Personnel Carrier as belonging to a certain element, but this does not happen at the beginning of a CEGE draw. None of the carriers, tanks, and trucks are numbered, so personnel are dealing with the battalion set as a whole. Company command and control relationships tend to break down somewhat, and it is very difficult for a Commander to exercise what might be a smoothly functioning chain of command during normal operations, because the area is filled with personnel he doesn't recognize. For example, teams of drivers under NCOs have been observed who don't know whether the personnel there even belong to the battalion, because they're in another company. All they know is that this man is a driver, so dialogue such as "Everybody in this group that has a license to drive a 113, raise your hand," or "All those who can drive a 578 recovery vehicle, raise your hand," is not uncommon. Thus, if two units are operating in the same general vicinity and experiencing this type of confusion, it is very easy to lose control of both organizations, not to mention the CEGE or the control organization; as a result, personnel will either not receive all the equipment they are assigned, or take more than their allotment.

Even in a wartime environment, a battalion can probably be issued in 4 hours; even under REFORGER conditions, it has been done in approximately 5 or 6 hours. Since a battalion can be issued in about 4 hours, it is certainly more beneficial to issue it sequentially as the personnel arrive or as higher headquarters provides priorities. Given this type of philosophy, there must be a fairly large area immediately adjacent to, but not a part of, the CEGE site for the unit that is currently drawing equipment to stage in to; this area can also serve as a holding area until this unit breaks up into convoys to move out to the Marshalling Area.

Only one staging area is necessary if the units are being issued one at a time, but two are really necessary: one for the unit that is currently drawing to go into, and one for the next unit to start moving into. These areas are literally open fields, which, if desired, may have some covering concealment. This, however, is a special consideration, since the areas are so close to the CEGE site itself that if the CEGE site is subject to aerial bombardment, the issue will be totally disorganized unless it is conducted under a very protective air umbrella. That umbrella would then extend over the staging area for the

time that a unit would be there, and it is anticipated that if a unit stays in that staging area for more than 2 hours after completing their draw, they have much more serious problems than simply forming up and moving out to the Marshalling Area. Each staging area should be large enough to hold the largest unit stored at that site in a fairly compact area, which must be separated from the actual issue process.

In addition to having the buildings sited to facilitate protection in the form of dispersion, other considerations include facilitating the movement of vehicles out of storage into the maintenance cycle and back into storage and expediting the processing of new receipts. Another important consideration is that personnel must be able to remove the vehicles from the warehouse, activate them, and easily move them out into the staging area in a sequence such that the issue flow will not "cross over itself" in any point. The best place to start is at the warehouse itself because the unit can draw nothing until it gets its equipment, its motive powers, and its Class 7 major items. In the case of a storage philosophy which calls for uploading the materiel or the nonmechanical equipment aboard the unit's vehicles, the issue sequence becomes quite simple. The trucks are already loaded with the nonmechanical equipment. There will always be certain items which are never uploaded because of their sensitivity, perishability, or any number of other considerations that will far outweigh the ease of drawing, but these items will constitute only a small fraction of the total equipment for any unit. So for all practical purposes, under an upload condition, it becomes a question during issue of having an easy path for the vehicle to exit from the warehouse, having the vehicle's battery and fuel put in, starting it, and performing a quick safety and maintenance check.

There must be a stopping point for vehicles that will not start or which are found to have serious maintenance deficiencies; this area must be out of the way so that it will not interfere with the next unit, unless the maintenance takes longer than a couple of hours or the vehicle won't be in the way of others behind it. It has been noted that when a philosophy of "fuel the vehicle and then install the battery" is used, the trouble always shows up after the battery is installed and the vehicle won't start. The activation facility must therefore provide for a bypass around those vehicles to prevent a queue from building up behind them and stalling the entire issue procedure.

One way to prevent such occurrences is devising a system for installing the batteries and fueling the vehicles while they are still in the warehouse. Various ways of issuing vehicles have been tried, and the most satisfactory is the method in which the vehicle is actually started in the warehouse and driven out; however, there are a number of problems associated with this procedure. First, the batteries currently used in POMCUS or in the Army inventory, are lead acid batteries, which are stored dry, since adding acid will limit its shelf life, unless it is kept under the correct temperature conditions and a slight trickle

charge maintained on it. The dry batteries could be put in the battery boxes of the vehicles, but then it would be necessary to find a relatively safe and easy way to put the sulfuric acid compound into the battery while it was in the vehicle; such a practice is not only unsafe but also renders the site vulnerable to sabotage of its battery acid, and therefore useless.

Another alternative is to store lead-acid-type batteries, which already contain acid, in some central location, under "trickle charge" conditions. This would create a maintenance and a storage problem in which literally thousands of batteries would have to be kept charged up, a task that would be extremely labor-intensive. Another alternative would be to purchase batteries with long shelf lives, the "die-hard battery" type that doesn't need acid, requires little maintenance, and is easy to start. Thus, the batteries are already in the vehicle and already have acid in them. They retain a shelf life charge for 4 years, which coincides with the maintenance cycle. If these batteries were used, it would no longer be necessary to install batteries in the warehouse, or store either the batteries or acid.

This introduces a related problem concerning where to store the fuel, how much fuel should be stored, or how to introduce the fuel into the vehicle if the tanks are stored dry. Gasoline-burning equipment must be stored with dry tanks having only a little preservative oil sprayed on the inside. The M880 series vehicles and the M151 jeeps are rapidly becoming the only vehicles in this category; nearly all the others have diesel engines. One solution to the fueling problem is to fill all the tanks and store the vehicles in the warehouse full of fuel. This type of storage is now being tested in CEGE, and its proponents feel that it could produce a very satisfactory solution, since the diesel fuel should easily last for the 4-year period between maintenance cycles.

Another alternative would be to rig the storage warehouse with a system of pipes and hoses that would allow fuel to be easily introduced from an underground storage tank next to the warehouse or in the central location of the site, or provide a coupling on the outside to which a bulk carrier could be driven. This would provide the fuel without the problem of having fuel-laden tanks sitting in the warehouse.

The point of all these solutions is getting the batteries and the fuel into the vehicles while they are in the warehouse, so the driver has to merely start the vehicle and drive it out the door. It becomes important to move away a dead vehicle, but that will be relatively easy, providing the vehicles are relatively compatible; the dead one can be pushed a few feet down so that the live one can be moved around it, or the dead one can be towed to maintenance. Thus, the drive-out concept is far superior to and far faster than towing a vehicle to a fueling point and then to a battery installation and activation point.

Under the uploaded concept, the equipment is on, and the vehicles need only be driven out to the staging area after being checked off. If the equipment is not uploaded, or if it is in a nonmechanical equipment storage facility, the cargo vehicles must proceed to that facility to be loaded out. There are a number of arguments about the sequence in which vehicles should be activated and moved out of the warehouse area, which is related to how they were stored, as well as to whether the facility design will allow them to be stored in the right sequence.

If vehicles are stored in an uploaded configuration, the combat vehicles should come out first, followed by the support vehicles, i.e., the tanks and APCs first, then the trucks with the nonmechanical equipment. However, if vehicles are stored in a downloaded configuration, the cargo-bearing vehicles must come out first so that they can proceed immediately to the nonmechanical storage areas and pick up the nonmechanical equipment while the combat vehicles are being activated. This has the effect of all the vehicles arriving at the staging area at approximately the same time.

Thus, the first vehicles coming out in a downloaded configuration must be the cargo vehicles, since they must have an easy route to the nonmechanical storage area, which should be designed to allow for three things. First, it must allow for the simultaneous unencumbered loading of vehicles and their trailers, a difficult situation, because the vehicles must generally be loaded from the back, and the trailer gets in the way. It would be better to bring the trailers over at the beginning of the issue sequence along with a little tractor that would haul the 1 1/2-ton trailer; while the mechanics were activating and checking the cargo-carrying vehicles, the laborers could be loading the trailers at the nonmechanical warehouse. These trailers become a little more difficult to move after they are loaded, but if the organic assets of the combat equipment company were used, they could be moved out of the way and placed where a truck could simply back up and latch onto them. Often, the trailer-bed height is different from the truck-bed height or a 5-ton truck's height, so it becomes necessary to accommodate the various loading heights to load the trailers and the trucks rapidly. Not only must the loading be rapid, but it must also be done either with the assistance of materials handling equipment or manually.

For ease of handling, the equipment is now stored on pallets; the pallets are not taken with the unit when it leaves, but simply dropped at the tailgate, and the troops load it by hand. The material taken from the pallet and the empty pallet itself are then put out of the way, so that the loaders have access to the rear ends of several vehicles simultaneously.

The number of loads varies from battalion to battalion. The divisional maintenance battalion probably has the most nonmechanical equipment of any when it is in a download configuration. So, to estimate how many S&P loads or how many 5-ton or 2 1/2-ton truckloads of

equipment that may have to be loaded simultaneously, use the divisional maintenance battalion as an example. Almost any combat service support unit must load a great deal of nonmobile, nonmechanical equipment. Three conditions must be met by the nonmechanical loading area. First, the trucks and the trailers should be loaded simultaneously, if possible. Second, various heights of loading platforms must be accommodated, and third, loading should be possible without forklifts or materials handling equipment, because it is quite possible that in time of war, none would be available or operable.

Another area of consideration is the storage of the PLL or prescribed load list -- repair parts for units at the POMCUS site. There is a uniqueness about repair part storage which almost absolutely dictates that this stock of repair parts must be continuously accessible. Generally, the PLLs are stored in M105 trailers and parts bins. The PLL itself is continually changing and requires its own facility for both accessibility and security reasons. Repair parts are always hard to get, and must be kept on hand for use during war. However, if a mechanic needs certain parts and knows that these parts are being stored close by, he will take them from the storage facility. Therefore, there must be a separate facility for storing prescribed load list repair parts so that (1) the trailers can be accessed and worked, and (2) proper security can be provided. The prescribed load list storage requirement is not very large. Some items that go on pallets fit in the back of a 2 1/2-ton truck involved in a prescribed load list, but the big storage problem is where to put the ASL (Authorized Stockage List) for the divisional maintenance battalion or any support maintenance battalion. The ASL consists of numerous trailers of repair parts, and it literally requires a separate storage facility. It's a huge operation, and must be accessible, because there is a constant turnover and a great deal of work constantly being done on it.

A CEGE storage site must be self-sufficient. One of the difficulties now existing in the Federal Republic of Germany with a unit outfitting itself for war, is that it must draw its various essential equipment from many different locations. To operate a POMCUS environment efficiently, provisions must be made for the unit to pick up its basic load of the various classes of supplies close to the site. Items which are handled relatively easily at the CEGE site itself would be items such as Class I (rations) which only require a different type of building, not necessarily special security considerations. The Class III items (lubricants) don't require any special storage facilities, but still, storage must be available.

Bulk POL storage is required for fueling vehicles at the CEGE site; since the fuel must sometimes be brought from quite a distance, the topping off of vehicle tanks is limited to one quarter of the tank; then, it is incumbent upon the customer unit or the drawing unit to use its bulk carrying capability to go to the bulk distribution point, fill up its tankers, bring them back, and top off the vehicles. This is very

inefficient, and is not a good way for the customer to use the available time for outfitting. There should be enough fuel at the CEGE site to allow for (1) the complete topping off of the vehicle fuel tanks, and (2) a complete topping off of the bulk POL carrying equipment within the units. For example, a mechanized infantry battalion would have either a tank and pump units, or an M49-A2C fueling vehicle that would be organic to it. The fueling vehicle must have its own tanks filled, as well as its fuel-carrying tank. This should be at the CEGE site; it then becomes a very simple matter for the unit to leave the CEGE site with all of its basic load of petroleum product. If extreme weather conditions are probable, it becomes even more important that large quantities of POL products be available simply to keep the equipment running and warm.

The site should contain a built-in means of easily jumping dead vehicles. This could be handled in one of two ways: it could be equipment organic to the CEC or the storing company, or a central, overhead receptacle could be built into the warehouse. For example, one or two jumper cables would be provided power from a centralized or a single 24-V DC source; the vehicle would then simply be plugged in and jumped there in the warehouse. This becomes very important during cold weather operations, because many vehicles are hard to start. Underground storage tanks for Class III items could very easily be built to both protect the product in the event of an attack, and to provide long-term storage capability.

Because of the sensitive nature of Class VIII (medical) material, storage will probably remain in a centralized facility or in a special storage facility; however, in the future, it may be necessary to design a facility for storing these materials. Such a facility would require security almost approaching the high level of weapons security.

The one area of self-sufficiency in a CEGE site that would create tremendous problems is providing the basic load of ammunition -- Class V. There are very, very limiting safety requirements on the storage of bulk ammunition. The computation of explosive safe quantity distances (ESQD) is a very detailed, precise process and often very expensive in terms of real estate. DOD regulations do provide for exceptions for nonmanned facilities to be interspersed among ammunition storage bunkers; however, the storage and uploading of Class V items creates massive congestion problems. Uploading the basic load of a unit such as a tank includes the necessity to load the ammunition round by round into the case of armor battalion tanks and sometimes the tracks of an artillery battalion, because the shipping containers aren't necessarily taken with the unit as it takes its basic load.

One way of unloading ammunition at the CEGE site is to drive the tanks by the bunkers and then pass the rounds into each tank. This is very expensive, both in terms of manpower and space required to park the tank around the bunkers, with the result of either a multitude of small bunkers or a long line at one or two larger bunkers.

An alternative is to load the trucks in bulk, drive them by the tanks out of the marshalling area so that they can take on their basic load, and then bring the trucks back into the ammunition storage site so they can load up the rest of the ammunition. This is a very expensive process and is used in some instances to upload the ammunition where great distances are involved. It would be preferable if the ammunition storage site were located between the CEGE site and the marshalling area, so that a unit on its way out would simply pick up its ammunition on the way to be marshalled. (For information about such a storage area, contact the 60th ordinance group or personnel at DCSLOG DA.) Information derived from the 60th group here and from the Federal Republic of Germany during the upload exercises for REFORGER '79 will be very helpful in designing a site that meets all the various requirements and still provides for rapid uploading of ammunition.

Even though the Class V would be associated with the POMCUS upload and the outfitting of the unit, the safety and other requirements of the ammunition storage and handling, as well as the specialized MOSs (Military Occupational Specialties), almost preclude its falling directly under the purview of a combat equipment company; in fact, it would probably stretch a company too far. This does not mean that the combat equipment group itself could not control the various ammunition handling or the ammunition storage companies that would be required to maintain the basic load (Class V), but rather that a separate company organization would run those ammunition storage sites.

Thus, a combat equipment battalion might have three combat equipment companies and three ammunition handling companies or similar organizations, each associated with its own unique mission. The battalion command and control system, with a few modifications, could handle the span of control and take care of approximately a division set, i.e., a combat equipment battalion that stores a division's worth of equipment. In addition to those three combat equipment companies, each one storing a brigade set there would be three ammunition-handling companies. Each company would store the ammunition for that brigade set, at a location close to the combat equipment company, so that the battalion would monitor the movement of troops into the combat equipment company and through the ammunition handling company into the marshalling area. Not all units would have to go through the ammunition site in the same force of strength that an artillery or tank battalion would have to go through; however, there are significant amounts of ammunition involved, and this is the only area in which there should be a completely separate organization to handle the outfitting requirements, because ammunition requirements are handled in such a special way.

The rest of the classes can be handled fairly well at the CEGE site, but there is one overriding consideration. When all the material of all classes that a unit must take is considered collectively, in order for this type of contingency issue to work; all of it must then be able to be transported on TOE-authorized vehicles. Storing equipment at the site will be useless if the unit cannot load its vehicles and leave immediately, because once the unit clears the combat equipment company site, it should not return unless there is a REFORGER and the equipment is being returned. The unit must carry off all equipment at once; otherwise command and control relationships would deteriorate. There might still be a residual truck or two in maintenance, but they must be out before the unit departs for the marshalling area or the area in the immediate vicinity of the combat equipment company; this may require one or two personnel and trucks.

There may be a time when a cargo-bearing vehicle breaks down and has to be towed into the marshalling area, or into the nonmechanical equipment area, loaded with its nonmechanical equipment, and then towed to the marshalling area, just to maintain that cargo-bearing capacity. Thus, this type of philosophy must permeate the entire setup of the POMCUS project, but the facilities must insure that there is no possibility of returns.

The philosophy behind POMCUS says that we do not have the capability to transport huge amounts of materiel instantaneously into a theatre, so the next best thing is to already have the materiel there and bring the people in to outfit it. There have been many discussions about how to improve the issue of POMCUS. But the question that has not been answered and the thing that most affects how we set up our business is how fast is fast enough when issuing equipment during a contingency? How soon must the unit be ready to go into combat, or just exactly how much lag time is allowed between the time the unit hits the ground in theatre and the time that it is expected to be fully committed to combat?

There has been no directive that states whether they should be out in 4, 8, or 10 hours, or the mission has not been met, so we have developed our own parameter that says we ought to be able to process one battalion every 8 hours or three battalions in 24 hours; however, these times were based on requirements for REFORGER exercises. Eight hours is a good daylight period; however, it has also been shown that there is virtually no difference between a day and a night issue as long as it is done behind the light-line.

In designing the site, the strategic philosophy underlying the establishment of the project should be considered. There must be a period of time during which this site would become activated and then emptied, and this time range should be the driving factor in the design. Other activities whose purpose is to keep the equipment in good operating shape are peripheral to processing a unit within a stipulated time. All facilities should be geared to that goal; the amount of maintenance and

work done during peacetime is molded around that. We must return to the idea that POMCUS is not a maintenance project, but rather a storage project, and the primary emphasis should be on the storage facilities to meet the issue requirements and protecting the equipment that is ready for issue.

The facilities must efficiently manage storage and the maintenance in storage of that equipment; as long as maintenance facilities are emphasized, the priorities are misplaced. For example, I would rather sacrifice something in the area of maintenance facility to get a storage warehouse that was both temperature- and humidity-controlled. If cost lines must be drawn, and it's the difference between putting pits in 12 of the 20 bays of the maintenance facilities and heating and air conditioning the warehouses, I would choose heating and air conditioning the warehouses. This is obviously an artificial trade-off, but when considering the ideal site, some side benefits of improvements like heated warehouses should be considered.

The choices should be made in favor of the storage activity, and the maintenance arranged to facilitate storage rather than access to the maintenance facilities. The philosophies that govern the cyclic maintenance principle and how cyclic maintenance is set up in this storage facility will help determine where and how the maintenance facilities are located. There are numerous philosophies of cyclic maintenance which can be followed, all of which produce approximately the same results with varying degrees of difficulty. For example, cyclic maintenance can be scheduled so that every piece of equipment is worked on once every 4 years using any of several methods. One method would be picking a UIC, working on it this year, writing down the UIC, and then not working on anything in that UIC for 4 years. This appears to be a fairly good system, except that given the nature of the Army's Authorization Document System and the fact that authorizations changed several times, there's a possibility that sometime during that 4-year cycle, a piece of equipment could be moved into that UIC that had not been worked on for 3 or 4 years, and then had been sitting for 2 or 3 more years before it was worked on again when that UIC came up for its normal cycle. This would mean that there would be equipment that could sit for as long as 5 or 6 years without maintenance, and unless extreme care is taken to watch for this type of situation, it could create problems.

This philosophy is essentially the same as the design consideration required for contingency issue which necessitates disturbing many UICs to gain access to one. A modification of maintaining UIC integrity during cyclic maintenance would be maintaining warehouse integrity during cyclic maintenance. A typical site might have 12 warehouses. On a 4-year cycle, equipment would be maintained in three warehouses per year, regardless of what UIC was involved. Now, given that unit integrity is being maintained within a given warehouse, work will be done on a whole warehouse at a time, which will simplify the control problem to a great extent, since it is known that three buildings will be worked on this year, and the other nine will remain essentially untouched,

since equipment will not be moved in and out for supply balancing reasons. This method would be very efficient, because it would prevent having to get at the units individually. There is very little difficulty, because a whole warehouse is being emptied at a time, or scheduling is done around one warehouse being emptied.

The difficulty arises when the equipment is replaced in the warehouse, because even though equipment can be withdrawn one row at a time, parts arrive randomly, and space is available only randomly. If a queueing problem were set up, it would be obvious that the maintenance completions, as they came out of this rather orderly withdrawal of equipment from the warehouse, would be essentially random, and equipment would also be replaced in the warehouse randomly. This is a control problem, but it must be realized that dealing with large sets of equipment, or essentially a whole warehouse at a time, almost certainly means that the equipment will not always be ready for storage in a uniform, orderly manner. Therefore, equipment will be moved in and out of the warehouse frequently, so design must be such that the available space can tolerate that type of abuse over a given period of time.

One example of a bad design is warehouse doors with tracks at the bottom which require a metal plate to be placed over them before vehicles can be moved in or out to prevent damage to the track. This requires that the door be opened all the way, which either damages the plate or the track. A door closure that is hung from the top, but which still provides a seal at the bottom is far superior and will tolerate the abuse of constantly opening and closing the doors and running equipment in and out, a practice which is very hard on the pavement because of the great amount of skidding around and because of the extraordinary physical forces during application of leverage. Again, there is the problem of random arrivals when dealing with whole warehouses full of equipment. The degree to which they can be easily handled depends on the nature of the equipment being stored. For example, if a specific space utilization dictates that a certain pattern of vehicles be placed on the floor, there will be some difficulty with handling random arrivals.

Another cyclic maintenance philosophy, one which destroys unit integrity, is putting all the tanks in one warehouse, all the 2 1/2-ton trucks in another, and all the jeeps in a third, etc. When this philosophy is used, it is no longer possible to know how many vehicles each unit gets. Although this method is inherently efficient and good for property accountability and control, it is not best from the standpoint of contingency considerations. The way that cyclic maintenance is done currently is probably the least efficient from the viewpoint of maintaining a given warehouse's storage integrity. Pieces of equipment in cyclic maintenance are now dealt with individually, and a record is kept on each truck or track; at the beginning of each year, those records are screened, and all equipment that has not been worked for 4 years is

flagged for work, regardless of its location in the warehouse or UIC. This method was used for several reasons, one of which was the implementation of the new TAADS '75.

This situation necessitated moving numerous vehicles, and similarly maintained vehicles could no longer be placed in a given unit set. Thus, vehicles are now in storage that have been maintained anywhere during the last 4 years. It will take 3 or 4 years to correct this situation, but it is very possible, in any future POMCUS project, that this type of system would evolve naturally due to vehicles being moved through change of authorizations, from the need to substitute vehicles in a REFORGER exercise, or from any number of other considerations. This returns the situation to the need for a large number of vehicle moves and easy accessibility to any vehicle in the warehouse, and there appears to be no way pulling these vehicles out of the middle of a storage facility can be made easy.

In cyclic maintenance, when a vehicle has been pulled out of its primary position in the warehouse, it is generally not returned to that position until all the maintenance has been performed and its preservation has been re-established, i.e., when it is awaiting parts and awaiting a space in the maintenance shop, it remains outside of the primary controlled-humidity storage. In most cases, this is a period of approximately 3 months; what is now lacking is a place to put these vehicles while they are waiting for maintenance, so that they are at least minimally protected from the elements. If they are not protected, all the good effects of 3 years of controlled-humidity and controlled-temperature storage, can be destroyed; the more deterioration there is from rusting, etc., the longer the maintenance cycle will be, because there will be more to fix.

A minimal protection area would help identify an area (waiting for parts, waiting for shop, etc.), and would help minimize the effects of the elements on the equipment. Such an area could be simply an overhead cover shed, built to allow access to each piece of equipment individually, on a random basis, because after a vehicle has been inspected, there is no way of knowing which one will be serviced next. Thus, a double row shed is required which would allow the vehicles to be parked underneath and pulled out randomly, one at a time, as necessary. These sheds would not only protect the vehicles, but would also provide the advantage of identifying the spot of a specific vehicle.

This type of shed would also help protect the trailers, which can deteriorate greatly when constantly exposed to the wind, rain, and sun. These trailers must be maintained once every 2 years, but the maintenance would last much longer or could be done less frequently if there was some protection for the trailer and its canvas. There are two ways to store trailers with canvas: one is with the bows mounted, but with the canvas packed in a hermetically sealed bag placed in the bed of the trailer. One is combat-ready, and the other requires some time to

replace the canvas. However, regardless of the system used, keeping water out of the trailer bed is a major problem, and a simple roof would greatly help in keeping water out. Also, when trailers with canvasses are parked outside during the winter, snow and ice sometimes become encrusted on the canvasses, and frequently, the weight will rip them, causing a great deal of unnecessary expenditure to replace them.

These sheds can also be used to store large items, such as construction engineer equipment. Although such equipment is generally built to stay outside all the time, there is no reason to unnecessarily expose it to the elements. An ideal site would include accommodations for storing this equipment under cover on hardstands so that it can be cared for properly and maintained in good condition.

Site Defense Potential

Literature Information

POMCUS System (CEGE Site) Potential 46.2
Site Design Considerations 46.4

User Information

Site Design Principles 46.10
Prototype Site Plan 46.19
POMCUS Site Design Examples 46.31

PURPOSE The current POMCUS System has evolved to overcome the lag of 20 to 30 days that would occur if the vast quantities of equipment associated with initial U.S. ground reinforcements of NATO were moved by sea. To ensure the integration of POMCUS into USAREUR'S operational planning there is the need to locate equipment for early-arriving battalion-sized combat units at new sites that would be closer to the operation area, (and less vulnerable). The present system has been logistically oriented and designed to support a deliberate reinforcement by large units. Thus, the utility of POMCUS has been much less than its potential.

ISSUES and ASSUMPTIONS

a. ISSUE: Additional POMCUS stocks at new sites in Europe may not be susceptible to damage by existing conventional air-to-ground munitions if some passive defenses are employed and if the warehouses are dispersed on the site. (3)

b. ISSUE: Unit sets of equipment should be standardized, and only minimum essential items should be prepositioned. (3)

c. ISSUE: The similarity in storage and readiness requirements of POMCUS and the TR-1 stocks suggests that in this respect both systems should be considered together. (3)

d. An effort is now underway in NATO to construct forward storage sites for ammunition that will permit stocks to be dispersed to reduce vulnerability and located forward to increase accessibility. After the units draw their equipment, they must then draw a 3-day load of ammunition for all their weapons...For some units, this load exceeds the amount that the unit's organic transport can carry in one haul. (3)

e. USAREUR has embarked on a 10-year program to turn all base operations and support functions not absolutely essential to field army operations over to the Standortverwaltung (STOV) (like our GSA) or to civilian contractors. (3)

f. The amount of damage that aircraft can cause to POMCUS sites, as opposed to other targets, is an important factor in assessing the likelihood that POMCUS will be attacked. Accuracy of visual bombing can be reduced by distracting or confusing a pilot; by antiaircraft fire, camouflage, haze or partial obscuration of the site by smoke. (3)

(3) "Vulnerability and Utility of U.S. Army Unit Equipment Prepositioned in Europe" Oct-1977

REQUIREMENTS	CRITERIA
a. CEGE site damage-reducing measures: (3)	
1. Obscuring the site with smoke.	1. Spacing of 180 ft (each way) is the smallest required for M3 Smoke Generators. (3)
2. Widely spaced CHWs.	2. p 70 (3) See b. in "Guidance" "
3. Hardened structures.	3. p 72 (3)
4. Storage arrangements for mutual shielding.	4. p 78 (3)
5. "Protective" walls surrounding CHWs.	5. See a. in "Guidance."
6. Counter-intrusion systems for site and building security.	6. See "site security," page 46.6.
7. Tonedown, camouflage, and landscaping to complicate visual attack.	7. See "site obscuration," page 46.7.

GUIDANCE

a. "Protective" walls for CHWs could include:
   1. 55 gal. oil drums (2 deep and 2 high) filled with sand.
   2. Concrete culvert pipe (on end in 2 rows) filled with sand.
   3. Precast concrete panels (15 in. thick--double reinforced)
   4. Corrugated-metal bin revetments filled with sand, (This is considered the best protection). (3)

b. Non-mechanical CHWs should be stored far enough away from the other CHWs so that they will have to be attacked separately and will not be damaged by bombs aimed at other CHWs. Other possibilities are to use a larger number of small buildings and/or construct "protective" walls (see a. above).

PURPOSE

A POMCUS site should be designed to enable the equipment to (a) be kept in good condition and (b) be issued rapidly in a contingency.

ISSUES and ASSUMPTIONS

a. CEGE Site Size (3)

A site should be large enough to permit the facilities and CHWs to be spaced far enough apart so that a single aircraft cannot effectively attack more than one building per sortie. Spacing is especially important in reducing the number of hits when bombing accuracy is poor. Also, the more buildings that have to be attacked individually, the less the overall damage. This suggests that a larger number of smaller CHWs be considered where enough land is available.

A number of small sites (with 6 to 8 CHWs) that are located near each other, and have common maintenance and administration facilities, may be preferred to a few large, self-supporting sites. First, it may be easier to find a number of smaller parcels of land than a few large ones. Second, size influences the efficiency of the issue process. Trying to process multiple units through a single large site, particularly where all supplies and facilities are centralized, can result in confusion and congestion. The larger the concentration of CHWs, the greater the efficiency in using maintenance personnel and facilities, providing internal security, and accounting for the stocks. The net preference would be for smaller sites if they can be located in such a way that reasonable management and maintenance efficiency can still be realized.

A division and its package of supporting units require 27 to 30 CHWs. The vulnerability and cost analysis in this report is based on an assumption of three sites per division with one for support units and two for combat units. Another alternative is four sites per division, with one for the division base and its support units and one each for a reinforced brigade. While such a separation of combat and support units may simplify equipment maintenance and management, it presents Pact air planners with an opportunity to concentrate attacks on the sites with the more valuable armored vehicles. To avoid this, the location of both combat and support units at each site should be considered.

b. Vehicle Movement (3)

Equipment must be issued to multiple units simultaneously. A traffic pattern for efficient marry-up should be incorporated into the site plan. Further, egress from the site should not be confined to a single route that can be restricted or blocked. Each site should store a sufficient amount of fuel, which is constantly replenished, to permit all vehicles to be activated and moved a reasonable distance away--say 50 miles--thus eliminating the need to provide fuel tanker support under crisis conditions. An external electrical source for starting the vehicles should be designed right into the warehouses. Adequate lighting to permit efficient 24-hour operation in and around the CHWs would speed up issue. The decision of whether or not to use it would depend on the situation, but if 24-hour operation permitted the sites to be cleared before hostilities began, the lighting would more than pay for itself. Also, warehouses should be equipped with exhaust systems, such as ceiling fans or rollback roofs, or even peel-off roofs, so that vehicles can be started inside the warehouses instead of having to be towed outside and activated in turn. (3)

c. Storage Facilities (3)

CHWs have been found to be effective for long-term storage of equipment and adequate for the bulk of the vehicles. (3)

Issue: If measures are taken (a) to prevent accurate visual bombing (e.g., by smoke, antiaircraft fire, tonedown, camouflage, etc.), (b) to space the CHWs far apart, and (c) to ensure that the roof will trigger rockets, CBUs, and API gun rounds, the use of hardened structures such as aircraft shelters will probably not be cost-effective. However, with low vulnerability as an important objective in the design of new sites, the whole question of building size, type, and hardness should be addressed again. Uncertainties in ricochet effects need to be resolved in order to assess accurately the potential protection afforded by various types of hardened structures. (3)

Issue: At one time portions of POMCUS were maintained with all equipment organic to a unit uploaded on that unit's transportation. However, accountability requirements and the constant high volume of changes in equipment components resulted in the downloading and commodity storage of these items. If the volume of this equipment could be reduced to combat-essential items, it would be feasible to again upload it on vehicles. Not only would issue be simplified and speeded up but equipment vulnerability would be decreased because the equipment would be more dispersed and better shielded.

ISSUES and ASSUMPTIONS

c. Storage Facilities (cont.)

Over time it has become common practice to store critical items such as batteries, electrolyte, weapons, communications equipment, and PLL/ASL and other basic issue items together to facilitate maintenance and accounting. These items are particularly vulnerable to blast damage. Site criteria should provide for protected or dispersed storage areas for these items. Protection could range from underground shelters to small bays in the CHWs that are surrounded by blast walls. Roller systems and truck-bed-high loading docks should be installed in warehouses where nonmechanical equipment is stored to reduce the time of issue and the requirement for special handling devices such as forklifts. The sites must also include extensive parking areas for trailers (which do not require CHWs) and vehicles awaiting maintenance or processing for return to their CHWs following maintenance. Roofed, open-air sheds for this latter category would help to prolong the useful life of most of the items. If these sheds can be made to look like CHWs from the air, they may also be attacked and thereby reduce the weight of attacks on the CHWs. (3)

d. Maintenance Facilities (3)

The weather in western Europe is not conducive to effective maintenance work out-of-doors or in unheated areas. Adequate hardstands are also needed to facilitate maintenance and issue. But they should not be located in the immediate CHW area because that would be the primary target for air attacks. (3)

e. Site Security (3)

Whether the site is within or outside an existing installation, its design should provide for fencing. The fence does not of itself provide any significant security, but it acts as a perimeter along which lights, sensor systems, guards, or a combination of these can be positioned. Security systems at all levels of sophistication are available. These range from a very simple radar detection system that can warn a central point that an intruder is in a warehouse to fully automated systems that sound an alarm the instant the perimeter is breached. A highly sophisticated system for a brigade-sized site would cost approximately $500,000. However, the system for each site has to be specifically designed to take the terrain, adjacent buildings, etc., into account.

e. Site Security (cont.)

A guard detachment would also be required to respond to an automated security system. Unfortunately, it is almost impossible to design a security system, no matter how expensive, that cannot be circumvented if enough effort is applied.

Security against a major effort, such as a significant sapper attack or an airborne operation, will have to be provided for in a comprehensive rear-area security plan. It would simply not be feasible to develop a separate plan to provide security for each POMCUS site against such threats. Military Police elements of the arriving POMCUS units should be a part of this planning because they will have security responsibilities in the assembly areas. (3)

f. Site Obscuration (3)

Measures to reduce bombing accuracies are necessary and possible. Smoke is one such measure. The terrain and weather conditions at a prospective site should be reviewed for compatibility with the use of smoke. Analytic techniques are available to predict smoke patterns as a function of wind, terrain, etc.

Other measures that can help to confuse pilots and thereby reduce aiming accuracies include the use of tonedown paints, camouflage techniques, and landscaping. There is certainly no reason to paint the CHWs light green and leave the surrounding land treeless, as is done today. None of these measures will prevent an enemy from knowing where the sites are; but in a wartime situation, when the enemy must contend with weather, smoke, and antiaircraft fire, measures such as these should help (a) to reduce the range of visibility and thus delay positive recognition of specific buildings, (b) to conceal or confuse individually important facilities and buildings, (c) to hamper precision bombing techniques. Tonedown and camouflage techniques should be an integral part of the initial site plan rather than afterthoughts, as is often the case. (3)

ISSUES and ASSUMPTIONS

g. Site Air Defense (3)

Without any air defenses at or near the sites, an enemy pilot will be able to seek out holes in the weather or smoke coverage, carefully select an undamaged target to attack, and then deliver his weapons with high accuracy, making multiple passes if necessary, and even perform a BDA between passes. In other words, he can make every round, rocket, and bomb count. Thus, it will be very important to have some air defense coverage of the sites. Even if the defenses do not shoot down any aircraft, their presence alone can distract a pilot and limit him to a single weapon-delivery pass under conditions that are not likely to produce high accuracies. (3)

h. Site Damage Control (3)

Provisions for fire fighting, chemical decontamination, blowdown removal, and EOD are essential. These could be provided by outside sources, such as adjacent U.S. or allied military units or by prior arrangements for contractor support. Although it is unlikely that fires will be caused by the explosion of GP bombs inside CHWs, because the vehicles are not stored with fuel or ammunition, some provisions for fire fighting should be made in case incendiary bombs are used or if fuel is stored at the site, as was suggested above. Blowdown could be a major problem and could seriously delay the issue process. Items of engineer equipment, such as bulldozers and cranes, should either be located at the site, and personnel trained to use them, or satisfactory priority for military engineer or contract support should be arranged. It would be foolhardy to spend money to properly store and maintain extremely expensive equipment without taking measures to preclude the possibility that its timely use could be denied by chemical attacks. Provisions must also be made for masks and protective clothing for site personnel. (3)

Each facility must have adequate fire protection. Should this service be provided by the local community, an agreement must be provided.

Types to consider:
a. fire ponds
b. expansive hydrant system

a fire protection facility is normally provided in LS. On sites where UBL is sotred, anticipate non-support from the local community.

NOTES

PURPOSE

A POMCUS site should be designed to enable the equipment to (a) be kept in good condition and (b) be issued rapidly in a contingency.

ISSUES and ASSUMPTIONS

POMCUS/POMSS SITE DESIGN PRINCIPLES

1. Components. The components of a POMCUS/POMSS site, given at the site scale for planning purposes, are summarized below:

a. Vehicle Storage - This consists of controlled humidity warehouses (CHW) of sufficient area for storage of vehicles and equipment of a mobile nature on the site.

b. Vehicular Open Storage - A hardstand area which essentially serves two purposes: First, it provides an exterior holding area for empty semi-trailers and other equipment which is to be utilized in conjunction with the remainder of vehicles and equipment in vehicular CHW storage during a mobilization effort. This area also serves as a temporary holding area for equipment awaiting maintenance after a REFORGER exercise.

c. Maintenance Holding - A hardstand area which serves as an immediate holding area for equipment awaiting periodic maintenance or maintenance following a REFORGER activity. It is within this area that equipment would be defueled and held prior to actual maintenance operations.

d. Vehicular Maintenance - Consisting of the Wash/Grease Racks, Mechanical Presentation, Organizational Maintenance and Engineering Maintenance facilities, this is the area within which all primary vehicular maintenance would take place.

e. Test Track and Pond - For testing of vehicles before and after maintenance operations.

f. Non-Vehicular Storage - CHW facilities for storage of non-mobile equipment which would be picked up by and used in conjunction with the vehicular equipment during mobilization. Most equipment would probably be stored in a down-loaded condition, except for COMMEL.

g. Trailer Open Storage - A hardstand area serving as an exterior holding area for empty trailers and the like, and used in conjunction with non-vehicular equipment located in CHWs. This area also would serve as a holding area for non-vehicular equipment awaiting maintenance.

ISSUES and ASSUMPTIONS

h. Non-vehicular maintenance - This consists of the non-mechanical maintenance facility, as well as the COMMEL maintenance, and weapons maintenance and storage facility. Other maintenance-related buildings, including the Workshop facility, repair parts storage, and others are also located in this area.

i. Bulk POL Storage and Pumping Station - An area consisting of earth berms within which temporary POL storage would be utilized in 10,000 gallon plastic bags and used for fueling equipment during mobilization efforts only. (Site "fuel and defuel" pads are used for this purpose during exercises.)

j. Shipping/Receiving - Consisting of the shipping/receiving facility, an exterior holding area, and access to a railroad and highway, if available. A loading ramp is also located in this area.

k. Site Headquarters - Including parking and helipad.

2. "Issue" or Mobilization Flow. (Figure 1)

The flow of material through a site during a mobilization effort is the single most important consideration in the design of the site. At the mobilization effort, personnel who are not familiar with the site geography will be required to operate and remove a considerable amount of equipment from the site in an expeditious and logical manner. The flow of material must be simple, linear, and direct. The flow should essentially proceed in one direction only, with potential for turnarounds to occur along this route, without delaying the Issue process.

Mobilization procedures.

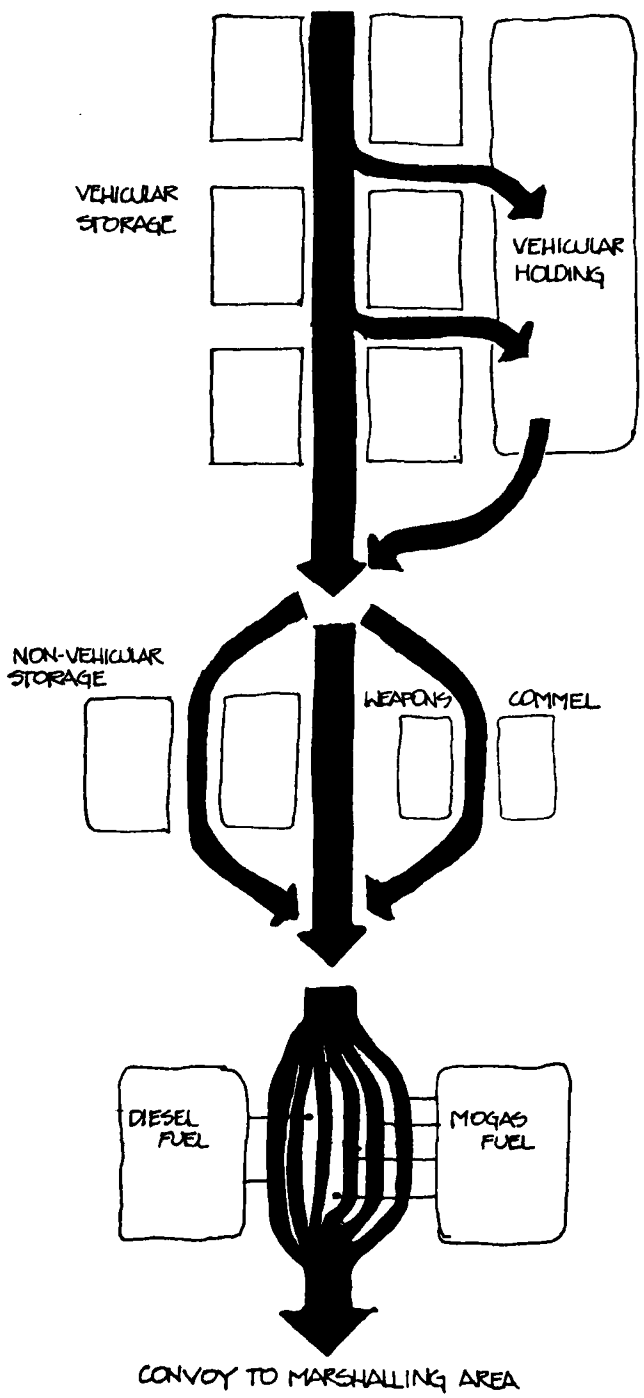
a. The CONUS unit determines equipment that must be brought from CONUS, trains and identifies personnel for their liaison party, advance party, and main body.

b. Site personnel develop and distribute issue plans, prepares hand receipts and performs as many functions as time allows to speed the issue.

c. Liaison party - The liaison party should arrive not later than 48 hours ahead of the advance party. They review the POMCUS hand receipt, site layout, issue procedures and coordinate several functions with the Assembly Area Control Group (AACG).

d. Advance party - The advance party is responsible for activating, repairing as necessary, and moving all POMCUS equipment to the Marshalling Area.

ISSUES and ASSUMPTIONS



ISSUE FLOW
(FIGURE 1)

ISSUES and ASSUMPTIONS

e. Upon the advance party's arrival at the site:

(1) Individual weapons are secured in CONEX containers and placed under guard (REFORGER issue only);

(2) CONUS unit key personnel receive an initial briefing (10 to 15 min) on site layout, Issue procedures and flow. Then, they are introduced and assigned to teams headed by the site key personnel;

(3) The remaining CONUS personnel in the Advance Party are then organized in the nine teams necessary for the issue:

<u>Issue Teams</u>

1. Control
2. Battery Filling
3. Driver
4. Fuel Handling
5. Battery Installation
6. Maintenance
7. Trailer
8. Ancillary Equipment
   a. NCOIC
   b. Crew Served Weapons
   c. COMMEL
   d. Light Engineer
   e. Non-Mechanical
   f. UBL
   g. ASL (Only the Maintenance Battalions have a team to obtain the Division's ASL of parts.)
9. Property Accountability

f. Issue of equipment - When the key personnel briefings are concluded, all personnel move to their respective functional areas. Figure 1 is a schematic of the issue flow. As the figure shows, several functions are performed simultaneously as the issue progresses. Each of the functions are summarized below:

(1) Removal of prime movers. Vehicles are removed from the CHWs by several methods. Tow vehicles belonging to the site, supplemented by vehicles in the unit set after activation, remove combat vehicles and the larger wheel vehicles. The smaller 1/4 ton, M880 series and some 5/4 ton vehicles are pushed out of the warehouse by the CONUS unit's personnel. Some heavy equipment is activated in the warehouse and is driven out under its own power.

ISSUES and ASSUMPTIONS

(2) Fueling. The fueling operations for MOGAS and diesel are separated to enhance speed and safety. Each vehicle receives a full tank of fuel from POL carriers.

(3) Battery installation. Batteries and holddown clamps are normally installed using assembly line procedures. However, some batteries may be uploaded or installed in the warehouse depending upon the situation (i.e., night issue, inclement weather, or site layout) to speed up the issue.

(4) Starting of prime movers. The operators check the vehicles before starting to insure safe operation. After starting, the vehicles receive a basic maintenance inspection and then move to a check point where instructions are given to proceed to one of the several locations: a) combat vehicles, with the exception of those used as recovery and tow vehicles, proceed directly to a holding/convoy area prior to going to the Marshalling Area; and b) wheel vehicles are directed to either the trailer park, ancillary equipment issue point, or to a holding/convoy area prior to going to the Marshalling area.

(5) Ancillary equipment loading. Ancillary equipment (crew served weapons, commel, light engineer, non-mechanical, UBL, ASL, and BII) are loaded simultaneously at different locations. An inventory to line number level is conducted at each of the locations, sub-hand receipts are signed for the items in bulk. When loading is completed, the vehicles pick up a trailer, if required, or proceed to the holding/convoy area prior to going to the Marshalling area.

(6) Trailer park. Vehicles designated to pull a trailer arrive from the check point or one of the ancillary issue points, have trailers connected, and either depart to pick up ancillary equipment or go directly to the holding/convoy area.

(7) Holding/convoy area. This is the final check point of the Issue where vehicles and trailers are verified for property accountability.

g. Marshalling Area - After the CONUS-based unit receives and signs for its unit set of equipment, convoys are established and proceed to the Marshalling Area. In the Marshalling area, the following are accomplished:

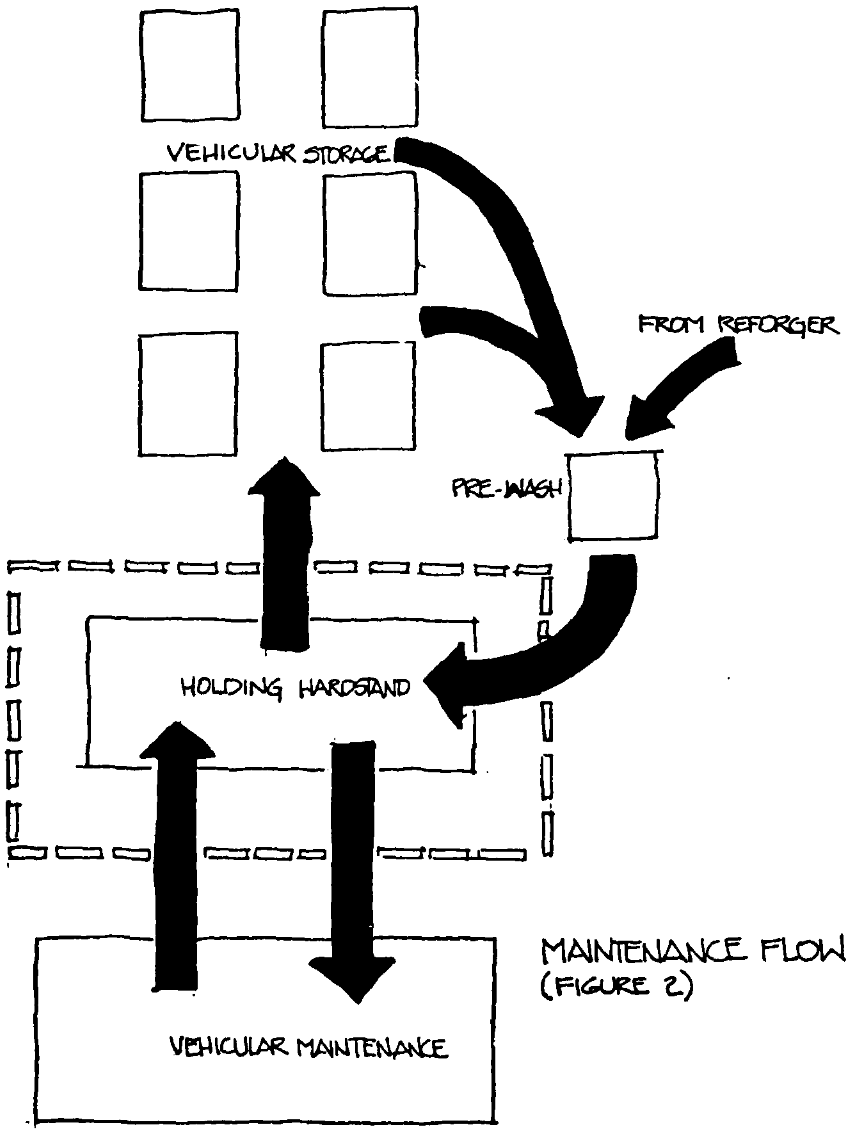
(1) Equipment (such as crew-served weapons, light engineer and non-mechanical equipment) is distributed, installed, checked, and made combat ready.

(2) Classes of supply not issued at the POMCUS site are received and made combat ready.

(3) The main body arrives and unit prepares to move into tactical operations.

3. Maintenance Flow. (Figure 2)

ISSUES and ASSUMPTIONS



MAINTENANCE FLOW
(FIGURE 2)

The facilities are designed to accommodate two modes of maintenance operations:

a. From REFORGER exercises: Equipment returns from off-site exercises. Tanks and other tracked vehicles are taken through a prewash tank bath. Equipment then proceeds to the maintenance holding area for tagging and inspections, with the vehicular holding area serving as an overflow for this area. The equipment is also de-fueled within the maintenance holding area. The vehicles and equipment can then proceed systematically through maintenance operations and back to Quality Check holding areas. Equipment is then returned to CHWs.

ISSUES and ASSUMPTIONS

b. Periodic maintenance: Periodically, equipment and vehicles are removed from the CHWs and taken to Maintenance Holding areas where the pieces are inspected and tagged, and then taken through maintenance operations and back to Quality Check holding area. The equipment is then moved back to the storage facilities.

4. <u>POMCUS/POMSS Facility Assumptions for the Prototype Site Plan (p 46.19)</u>.

a. Ammunition Storage

Formulas for determining separation distances:

1. Distance between igloos and manned facilities:

Distance (ft) = $50\ W^{1/3}$

where W = explosive weight of ammunition in one igloo in pounds.

2. Distance between igloos:

Distance (ft) = $1.25\ W^{1/3}$

Total ammunition required for a typical POMCUS site (one fourth of a division) = 1200 tons

Assume 40 percent of the ammunition is stored on site (60 percent off) = 480 tons

Therefore, amount of ammunition per igloo (eight igloos) = 58.75 tons or 117,500 lbs.

W = 117,500 lbs
$W^{1/3}$ = 48.98, say 50

Distance between Igloos: $1.25W^{1/3}$ = 62.5 ft.
Distance to manned facilities: $50W^{1/3}$ = 2500 ft.

b. Distance to unmanned CHWs from ammunition storage = 2300 ft. as $46W^{1/3}$.

c. Assumed areas of CHWs (70' x 300' = 21,000 sq ft):

-For Vehicles: 18 @ 21,000 SF = 378,000 SF
-For Non-Mechanical Equipment: 4 @ 21,000 SF = 84,000 SF
-For Ration Storage: 1 @ 21,000 SF = 21,000 SF
-For Packaged POL Storage: 1 @ 21,000 SF - 21,000 SF

Total CHW Storage Area 504,000 SF

AD-A093 672 CONSTRUCTION ENGINEERING RESEARCH LAB (ARMY) CHAMPAIGN IL F/G 15/5
TYPE II FORWARD STORAGE SITE FACILITIES: POMCUS SYSTEM. VOLUME --ETC(U)
SEP 80 R L PORTER
UNCLASSIFIED CERL-TR-P-112-VOL-2 NL

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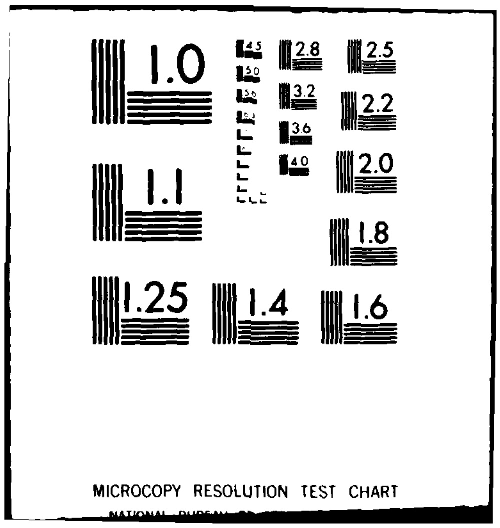
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MICROCOPY RESOLUTION TEST CHART

d. No on-site storage of bulk POL is anticipated. Earth berms and facilities are provided for bulk POL pump stations, with POL products expected to be brought to site during an Issue operation.

e. The acreage required as a buffer zone for ammunition storage can be made available for agricultural production.

- -Total Acreage shown for CEGE Site = 650 Acres
- -Acreage in Agricultural Production = 300 Acres
- -Acreage for CEGE site functions = 300 Acres
- -Acreage for Life Support functions = 50 Acres

NOTES

POMCUS Site Design Principles

Prototype Site Plan

1. **DETERMINE SIZE OF SITE:**

   A site should accommodate approximately a brigade set of related units plus an additional portion for Corps Support Units. Typical area requirements range from 50 to 60 hectares if no ammunition is stored, to 290 hectares with ammunition storage on site.

2. **MAINTAIN REQUIRED SAFETY DISTANCES:**

   A distance between manned facilities and ammunition storage units of $50W^{1/3}$, where W is the explosive weight, in pounds, of the contents of a single ammunition storage unit. (Distance [ft] = The cube root of 50 X W [lbs.]). The option of either partial or total ammunition storage required off-site needs extensive policy level investigation.

3. **MINIMIZE THE VULNERABILITY OF MULTIPLE FACILITY DESTRUCTION:**

   This may be done through site layout configuration and arrangement of storage buildings; i.e., buildings should not be arranged in large blocks or long straight lines. Hardening of structures or placing CHWs totally or partially below grade will also minimize multiple building destruction during hostilities.

4. **PROVIDE OPTIMAL ISSUE FLOW:**

   This requires a simple, linear, and direct traffic flow of materiel during an issue. Points of significance include:

   A. "Dead Ends" within the roadway system should be eliminated through the use of turnaround at convenient points throughout the issue route to minimize "backing" of vehicles into the issue flow.

   B. Hardstand holdings areas must be placed adjacent to vehicular storage to allow for efficient assembly and installation of equipment on transport vehicles and on the trailers they carry.

5. ***EFFICIENT FUELING DURING ISSUE:***

   Provide bulk POL either in permanent underground tanks or provide earth berms for 5000- or 10,000-gallon bladders to be used during a mobilization. Allow for queuing of vehicles for fuel separate from "through" traffic flow.

6. **PROVIDE OPTIMAL MAINTENANCE FLOW:**

   Locate the maintenance facilities for the various components close to the CHWs that are storing that component. Maintain simple, direct, and sequential flow of materiel through maintenance procedures, and through convenient placement of hardstand holding areas between or adjacent to the storage and maintenance facilities. Covered areas are to be provided for a portion of the hardstand areas.

7. **EFFICIENT STORAGE FACILITIES:**

   Design typical CHW for flexibility of unit assignments, and design universal access for efficient issue and maintenance operations; i.e., both ends totally open.

8. **VEHICLE SERVICEABILITY VERIFICATION:**

   Design test track and test pond on site, using the existing roadway system if possible.

9. **EFFECTIVE USE OF LAND:**

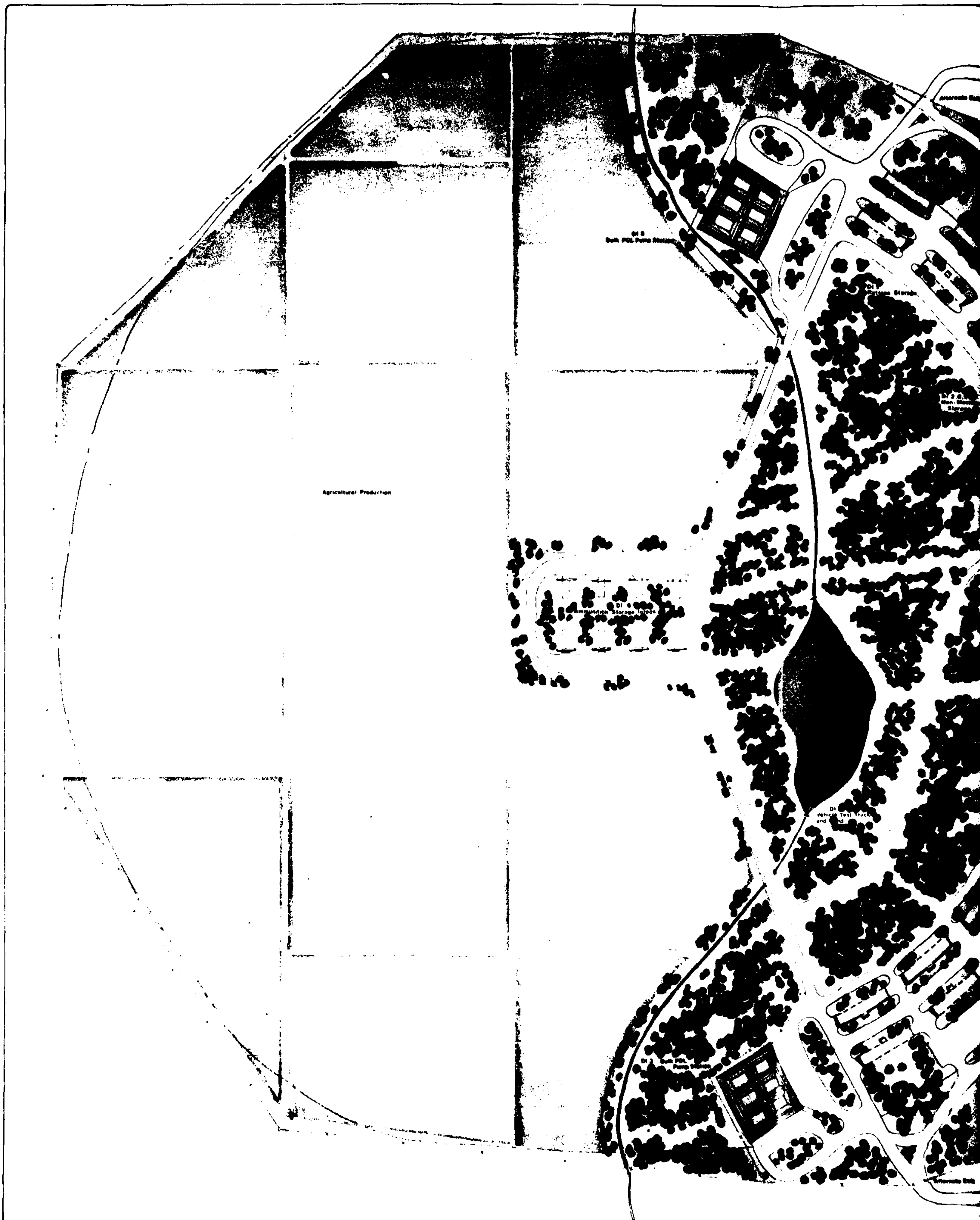
   Agricultural production may be incorporated within the site design to serve as a buffer for required safety distances.

10. **EFFICIENT RECEIVING OPERATIONS:**

    Allow for receiving materiel through all available transportation modes, including rail, highway, and helipad.

11. ***EFFICIENT PLL AND ASL STORAGE:***

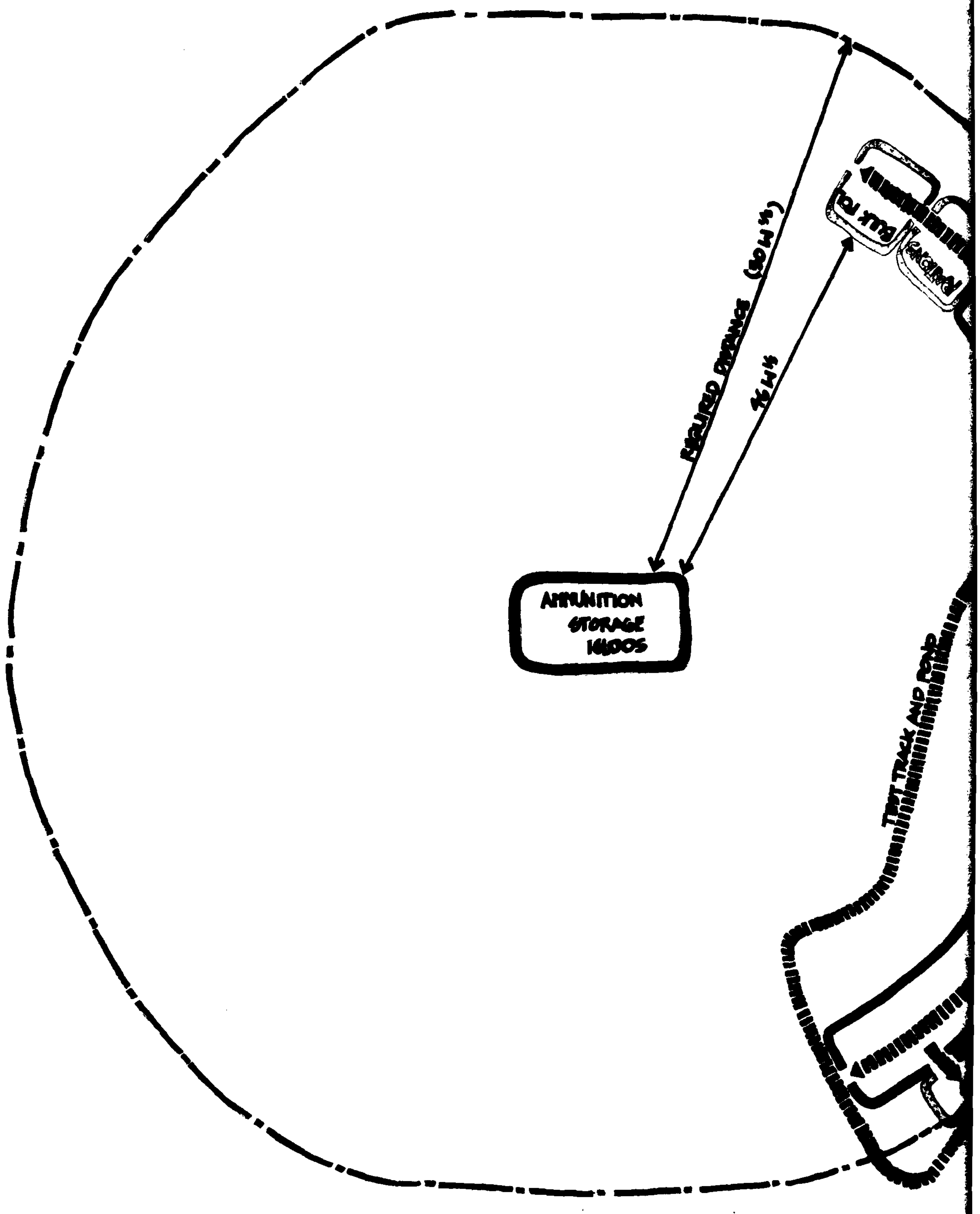
    Repair parts must have their own secure facility for easy updating and to ensure the availability of a complete parts stock for issue.



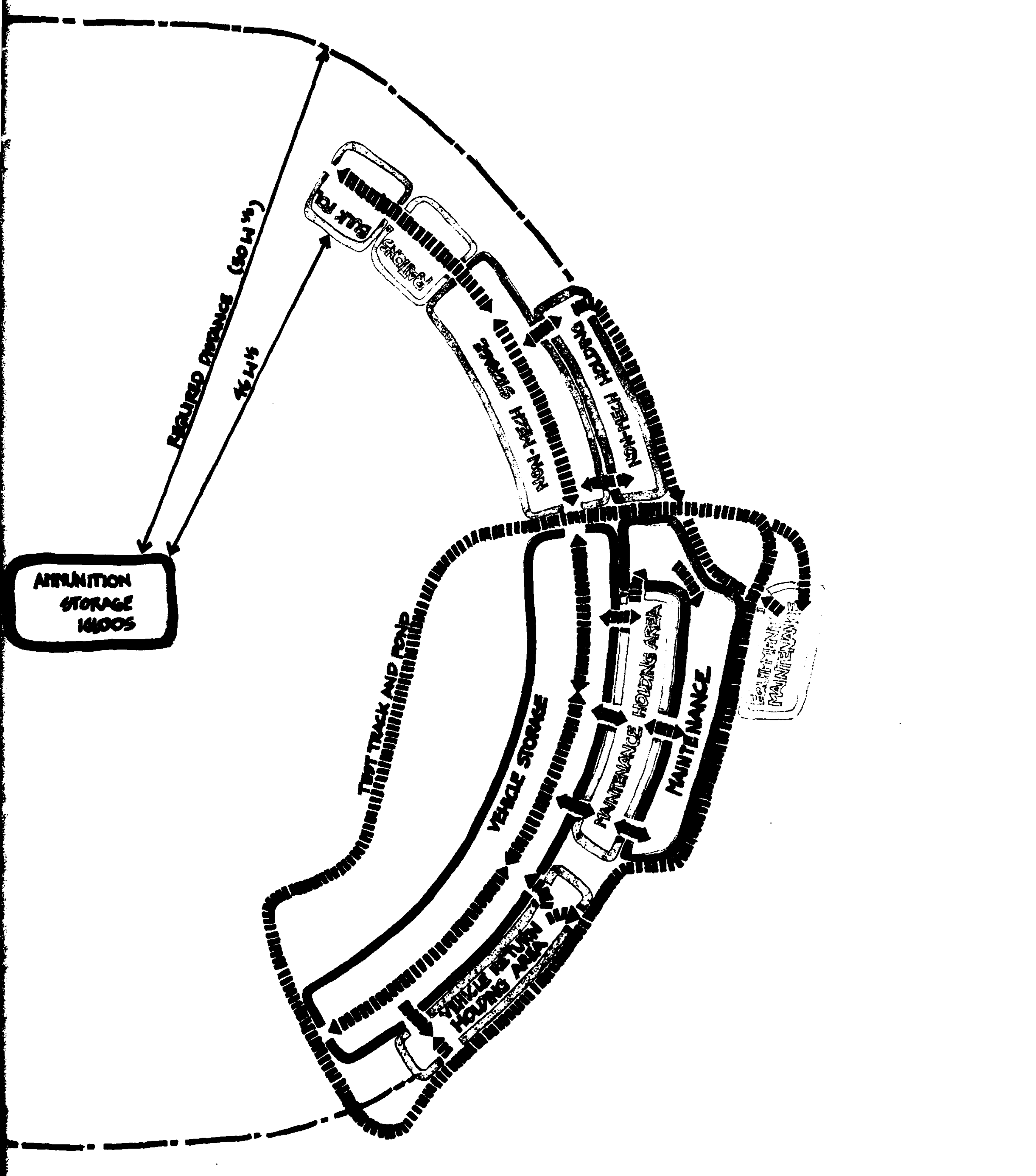
POMCUS System: General Site Plan

Alternate Exit
Railroad
Highway
DI 5
Construction
Material
Storage
DI 2 & 3
Non-Mechanical
Storage
Rations Storage
Weapons Maintenance
and Security
DI 20
DI 3
Pump
Station
Non Mechanical
Maintenance
DI 16
COMMEL Maintenance
and Storage
DI 14
Trades Building
DI 21
DI 18
Repair Parts Storage
DI 10
Railhead
Loading Dock
and Ramp
Organizational
Maintenance
DI 17
Shipping Receiving
Facility
DI 24
Engineering
Maintenance
DI 15
CEC Headquarters
DI 40
Heliport
Major Entrance
DI 27
Sentry Post
Life Support Facilities
Vehicle
Exercise Holding
and Inspection Area
Alternate Exit
scale
feet

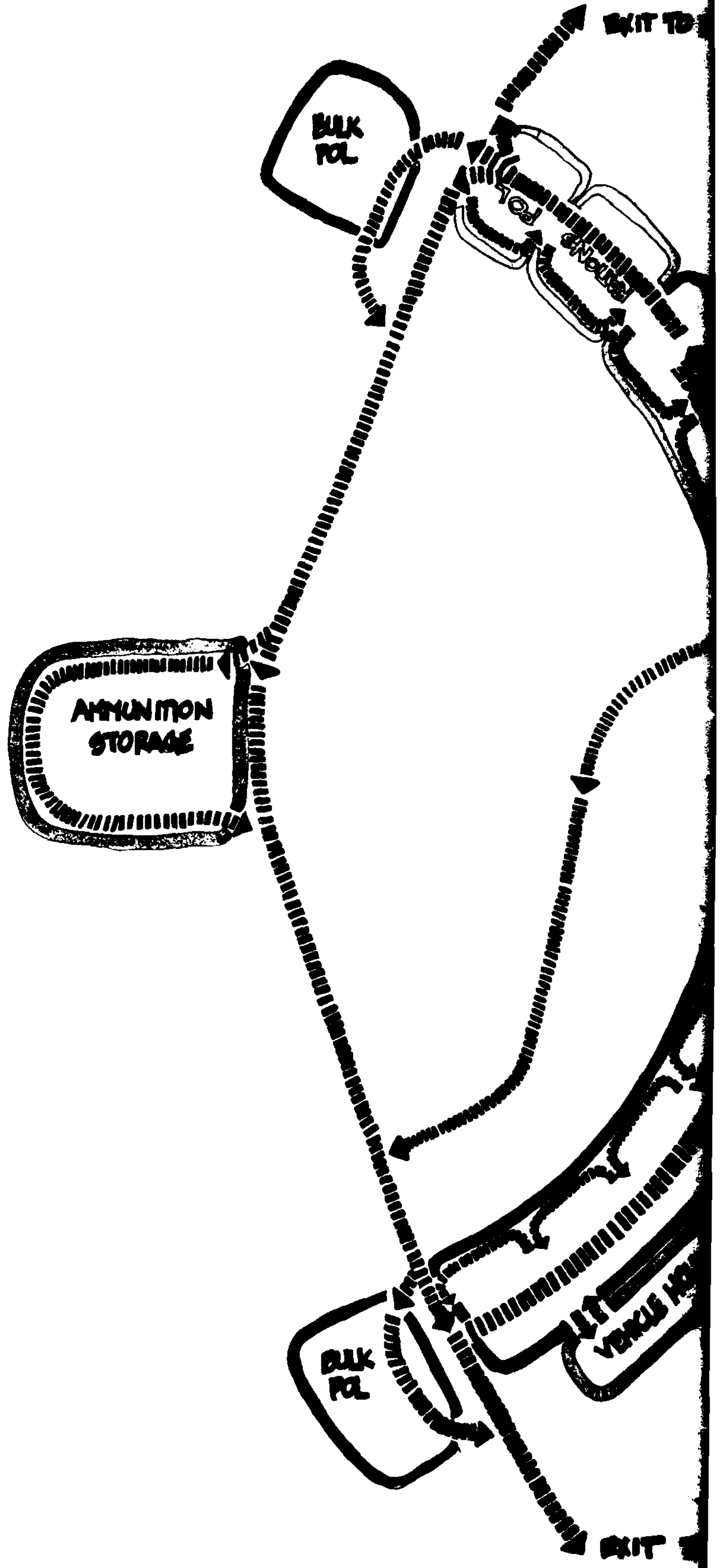
Site Plan



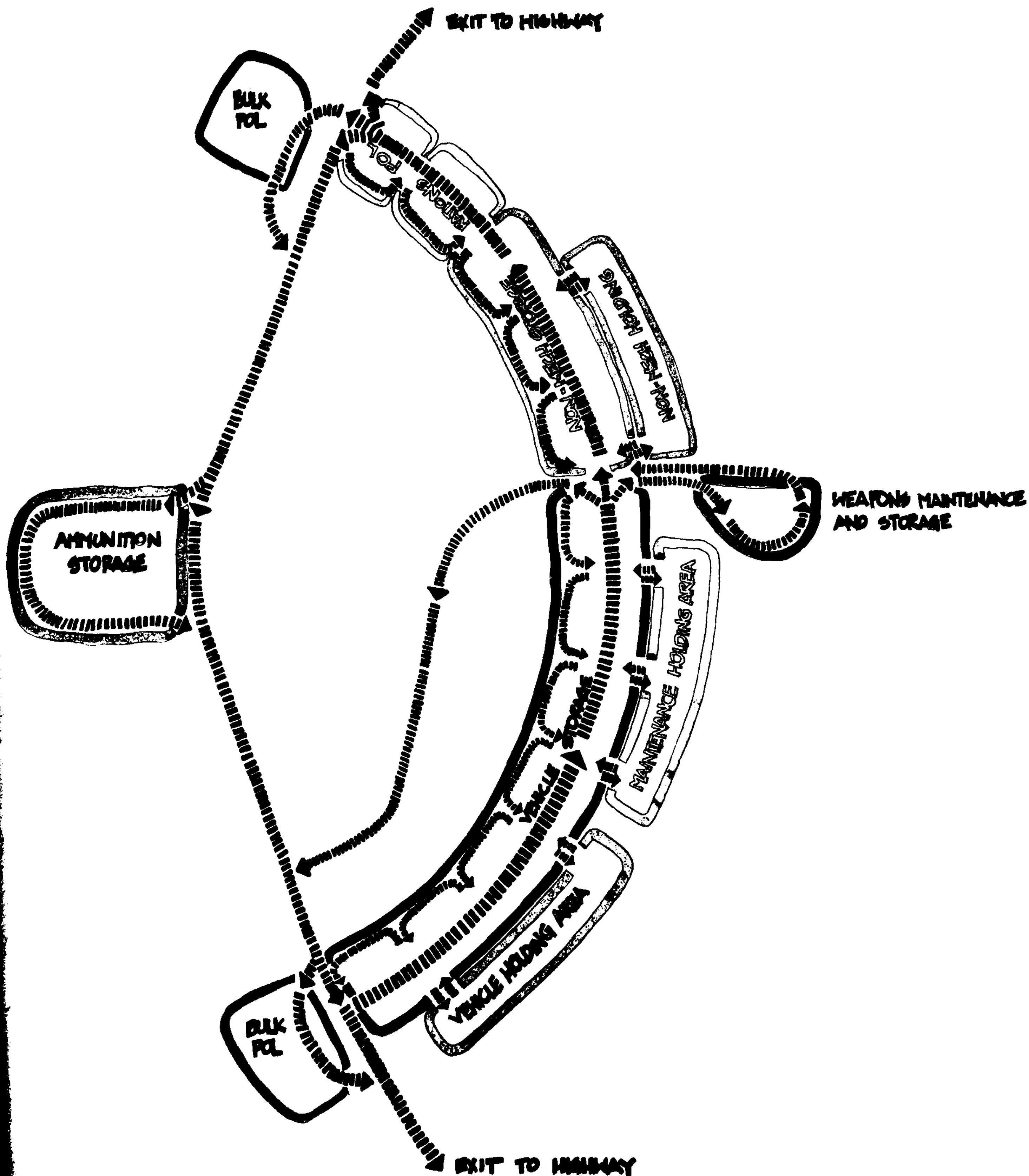
POMCUS System: Maintenance Flow

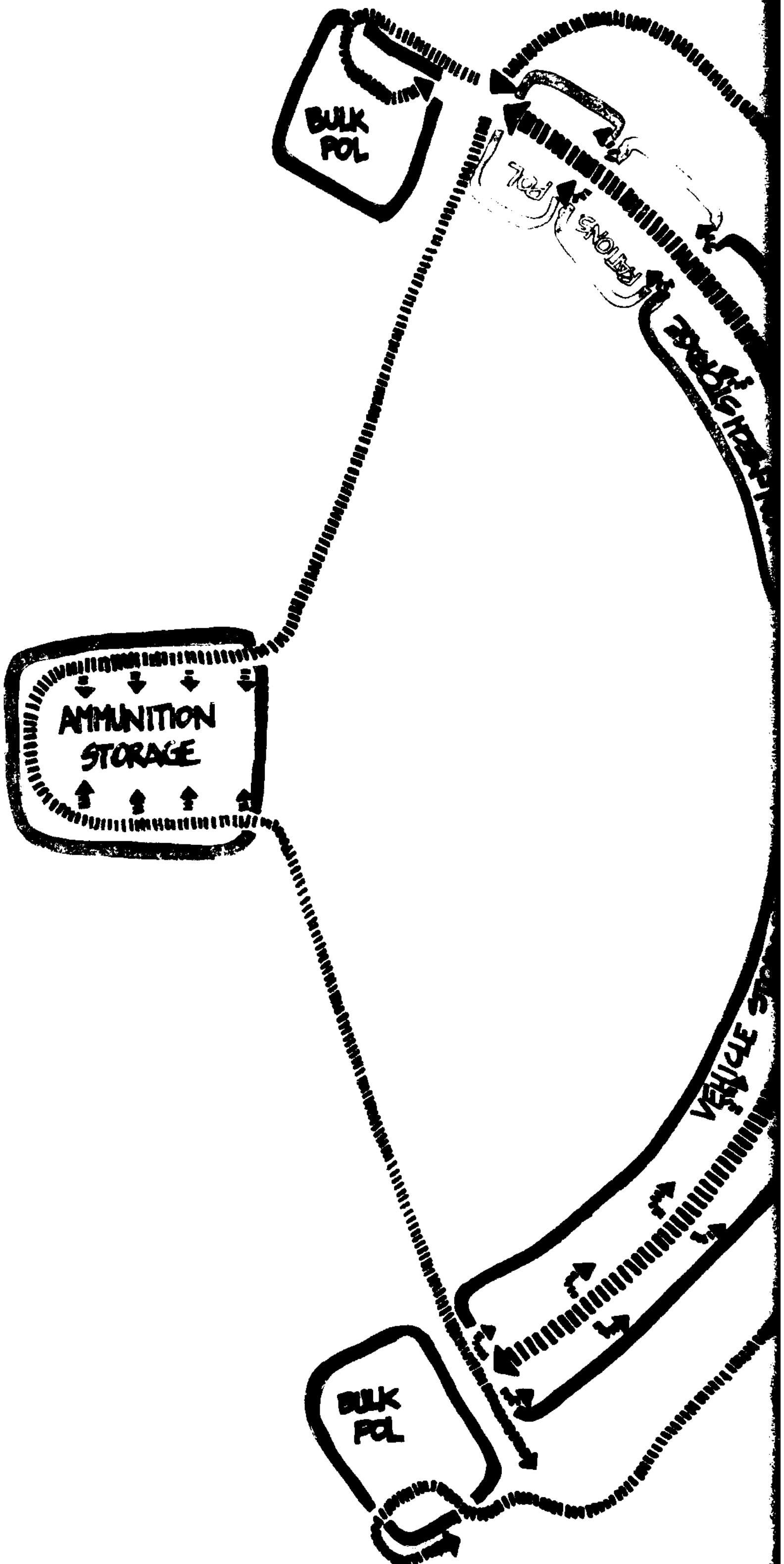

AMMUNITION STORAGE IGLOOS
REQUIRED DISTANCE
TEST TRACK AND POND
VEHICLE STORAGE
MAINTENANCE HOLDING AREA
MAINTENANCE
NON-MECH STORAGE
NON-MECH HOLDING
VEHICLE RETURN HOLDING AREA

ce Flow

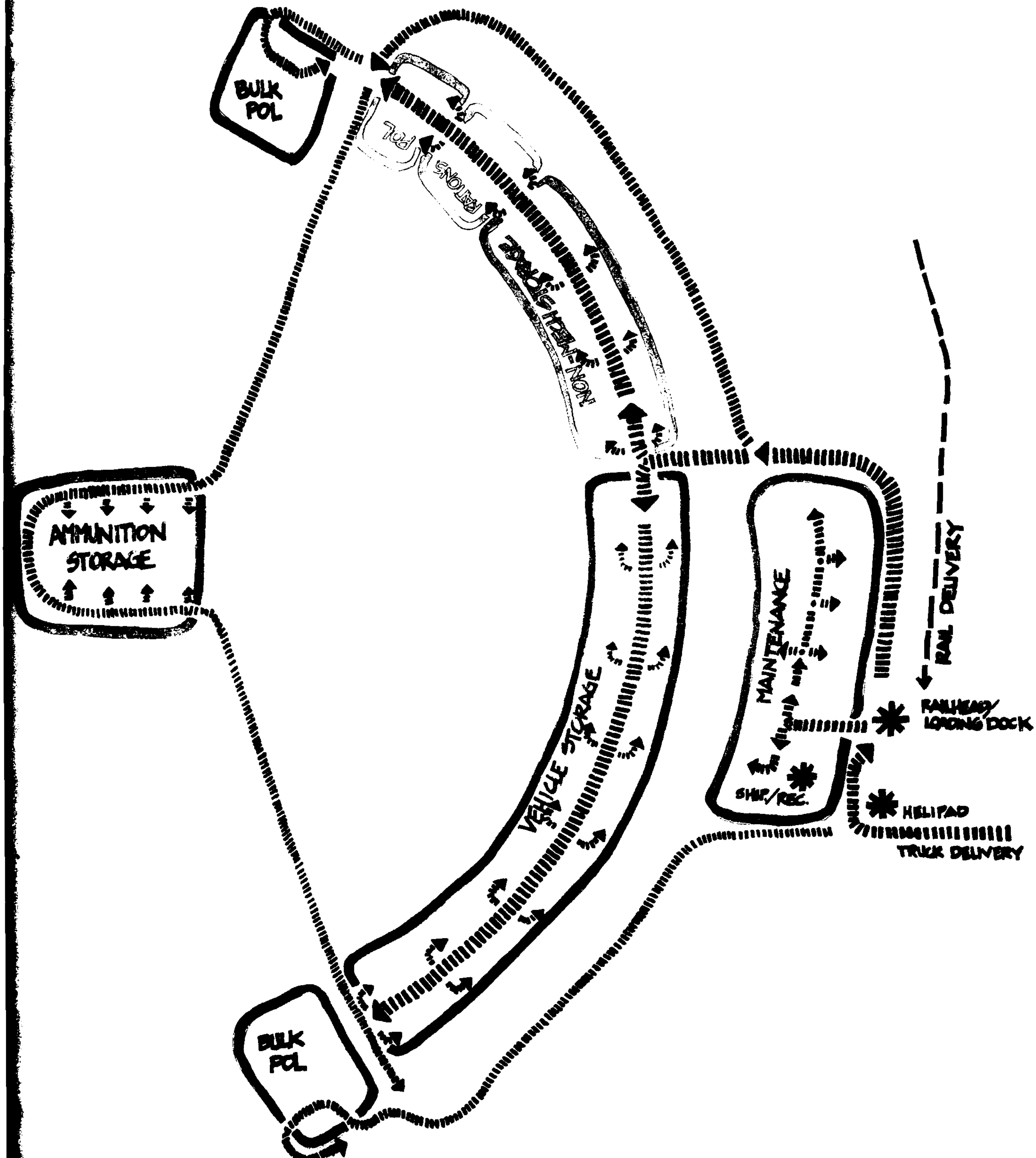


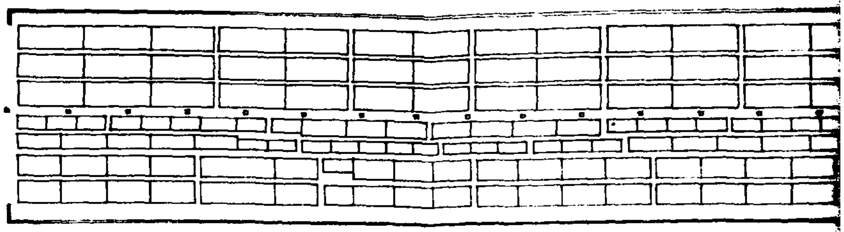
POMCUS System: Mobilization Flow

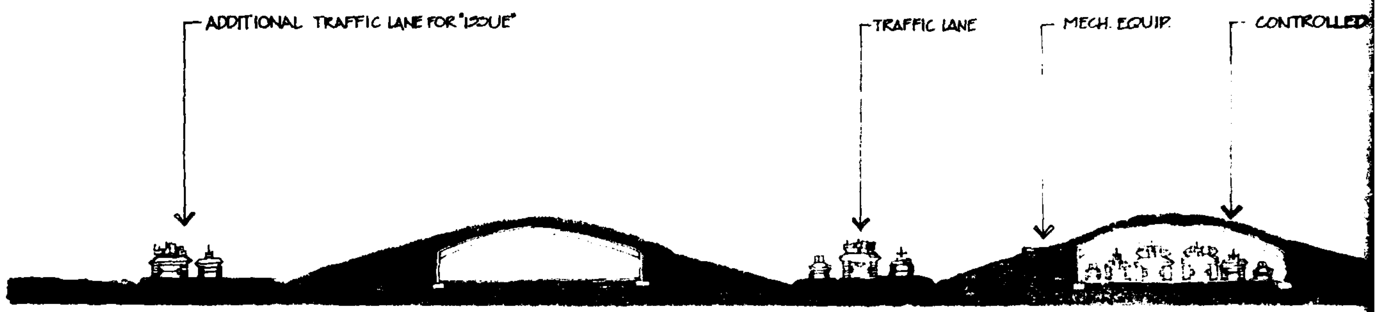

EXIT TO HIGHWAY
BULK POL
POL
RATIONS
NON-MECH STORAGE
NON-MECH HOLDING
AMMUNITION STORAGE
WEAPONS MAINTENANCE AND STORAGE
MAINTENANCE HOLDING AREA
VEHICLE STORAGE
VEHICLE HOLDING AREA
BULK POL
EXIT TO HIGHWAY

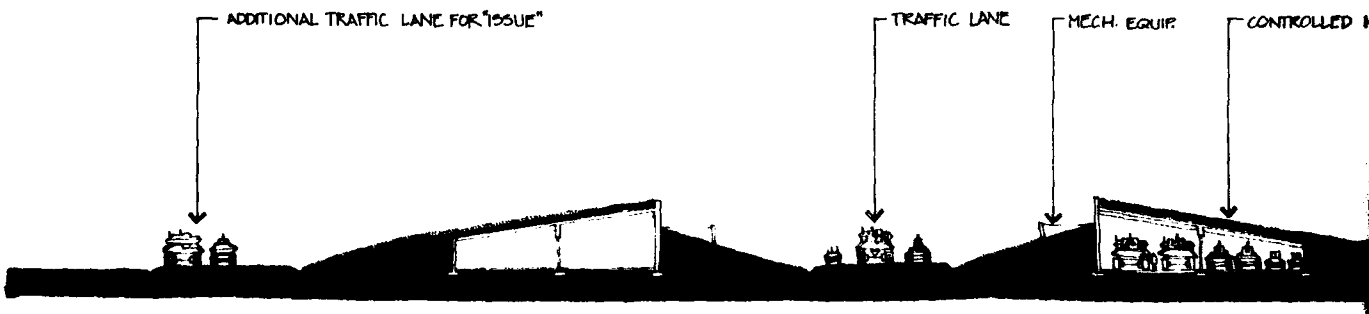


POMCUS System: Materiel Receiving

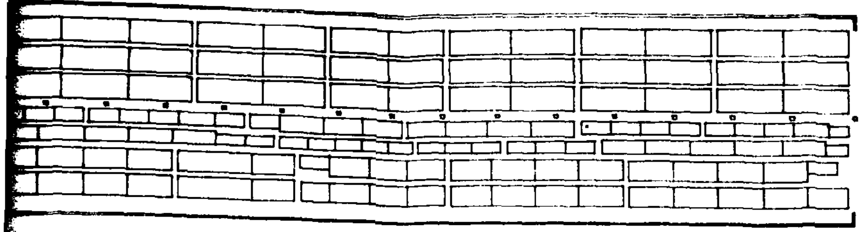

BULK POL
POL
RATIONS
NON-PERISH STORAGE
AMMUNITION STORAGE
VEHICLE STORAGE
MAINTENANCE
SHIP/REC.
RAIL DELIVERY
RAILHEAD/ LOADING DOCK
HELIPAD
TRUCK DELIVERY
BULK POL



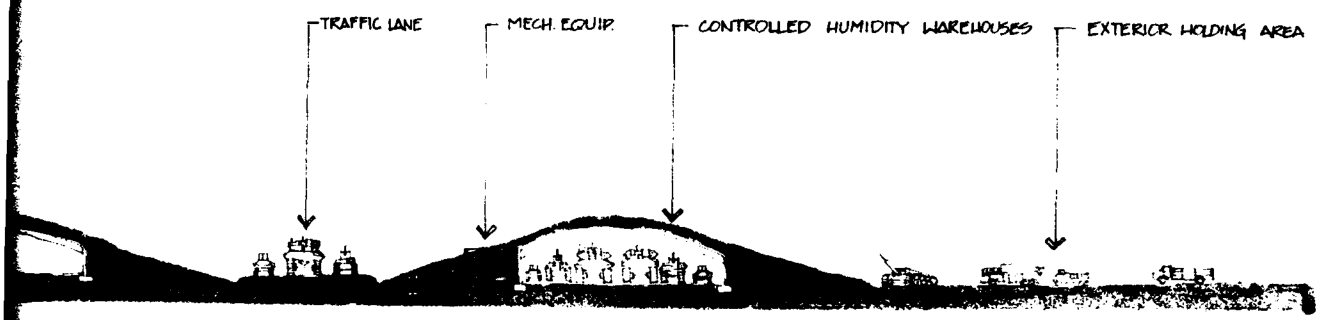


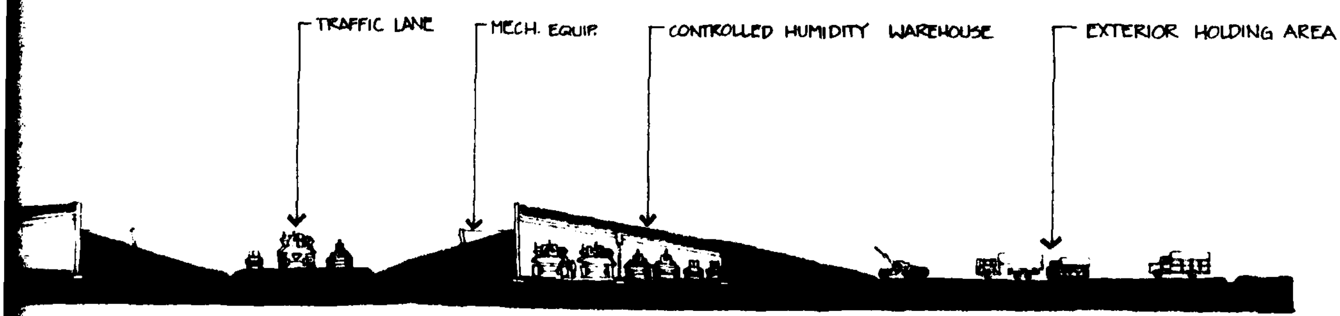


POMCUS System: Alternative Storage Facilities



TYPICAL STORAGE FACILITY PLAN





POMCUS Site Design Principles

A Proposed Site Plan for Emmen, Netherlands

46.31

1. **DETERMINE SIZE OF SITE:***

This site was assigned 20 CHWs of 40,000 sq. ft. each and the associated maintenance facilities. No ammunition storage was required. The site selected contains approximately 48 hectares.

3. **MINIMIZE THE VULNERABILITY OF MULTIPLE FACILITY DESTRUCTION:**

Placing CHWs in large blocks or long straight lines was avoided in this scheme.

4. **PROVIDE OPTIMAL ISSUE FLOW:**

Issue flow begins with the vehicular storage CHWs and vehicular holding areas, and moves in a one-way direction through non-vehicular storage and holding, providing a branch route for weapons and COMMEL equipment. All flow converges then at the fueling station. "Deadends" and "backing" of vehicles are avoided through the use of "turnarounds" at a number of locations and optimal routes to other storage and hardstand holding areas.

5. **EFFICIENT FUELING DURING ISSUE:**

Earth berms for 5000-gallon bladders are provided near the terminal point of issue flow on site, with allowance for queuing but not interfering with "through" traffic.

6. **PROVIDE OPTIMAL MAINTENANCE FLOW:**

This was done by providing adjacent locations for CHWs and the relevant maintenance facilities; i.e., vehicular storage close to vehicular maintenance. Components of vehicular maintenance are arranged to provide for the sequential nature of both REFORGER and normal maintenance activities.

7. **EFFICIENT STORAGE FACILITIES:**

Allowance for universal access from both ends of CHWs was made.

8. **VEHICLE SERVICEABILITY VERIFICATION:**

Test track can be incorporated into the street around the CHWs.

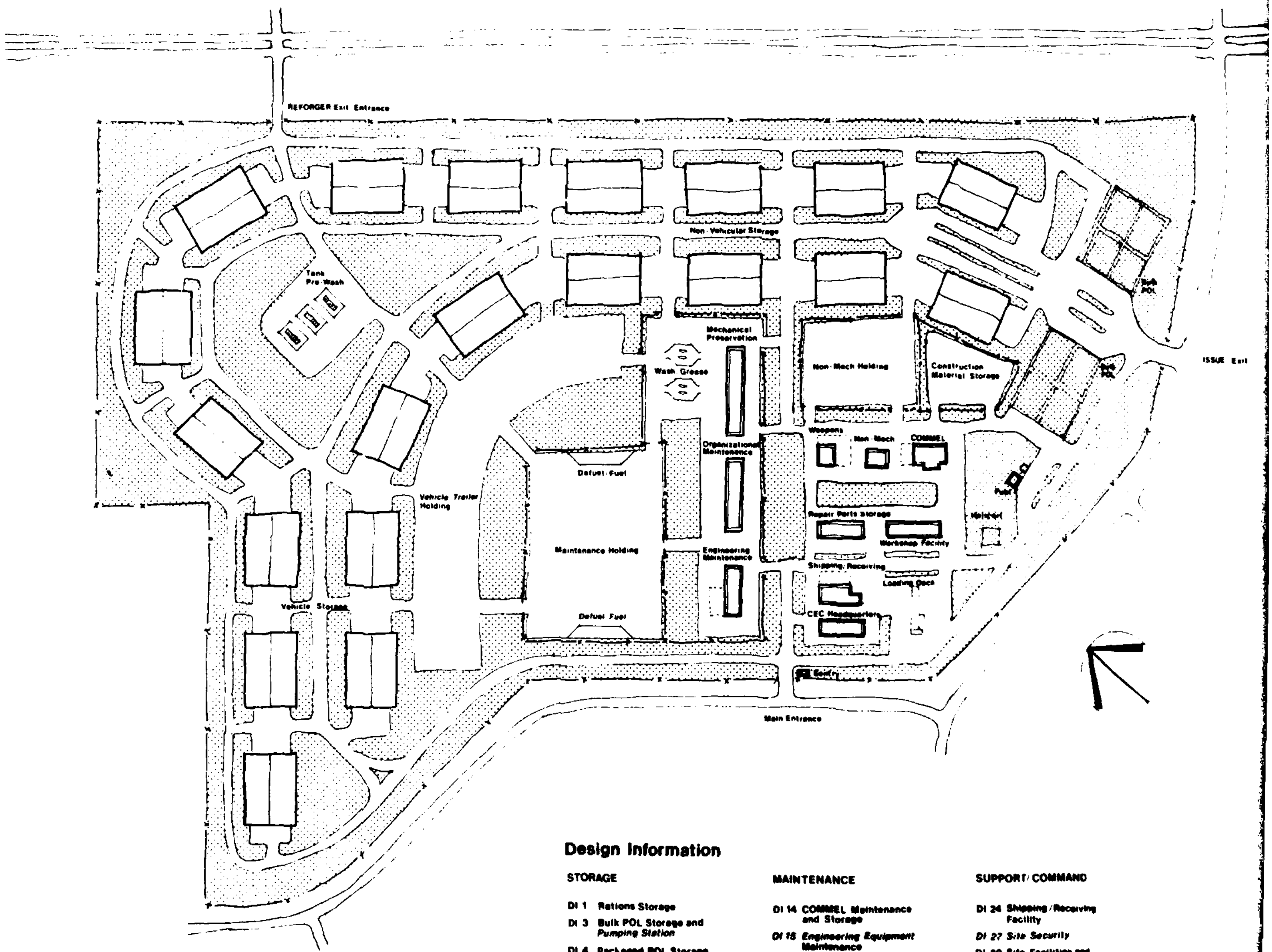
10. **EFFICIENT RECEIVING OPERATIONS:**

A shipping/receiving building and loading dock are located for convenient access from the main gate for highway deliveries.

11. **EFFICIENT PLL AND ASL STORAGE:**

A Repair Parts Storage facility is provided near the maintenance areas and is on the issue flow route.

* See p 46.20 for complete list of POMCUS site design principles 1 through 11.



Design Information

STORAGE

- DI 1 Rations Storage
- DI 3 Bulk POL Storage and *Pumping Station*
- DI 4 Packaged POL Storage
- DI 5 Construction Material Storage
- DI 7 Vehicle and Equipment Storage
- DI 8 Compressed Gas Storage
- DI 9 Medical Supply Storage
- DI 10 Repair Parts Storage

MAINTENANCE

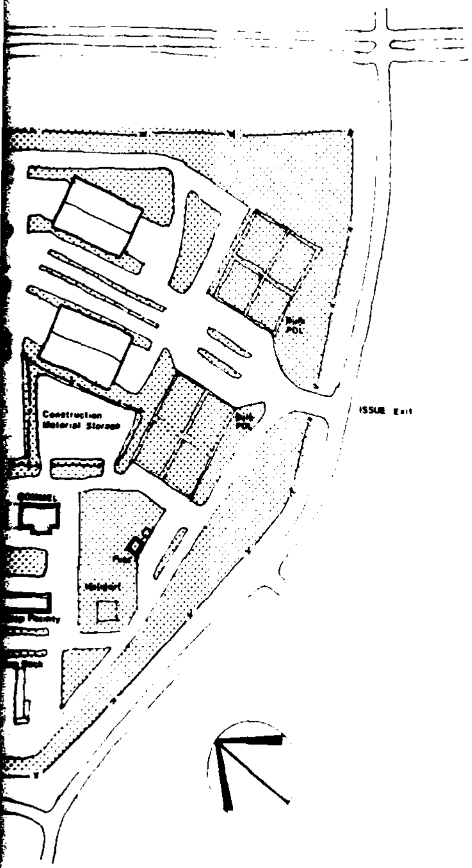
- DI 14 COMMEL Maintenance and Storage
- *DI 15 Engineering Equipment Maintenance*
- DI 16 Non-Mech Maintenance
- DI 17 Organizational Maintenance
- DI 18 Mechanical Preservation
- DI 19 Wash/Grease Racks
- DI 20 Weapons Maintenance and Security
- DI 21 Workshop Facility

SUPPORT/COMMAND

- DI 24 Shipping/Receiving Facility
- *DI 27 Site Security*
- DI 29 Site Facilities and Utilities
- DI 40 CEC Headquarters

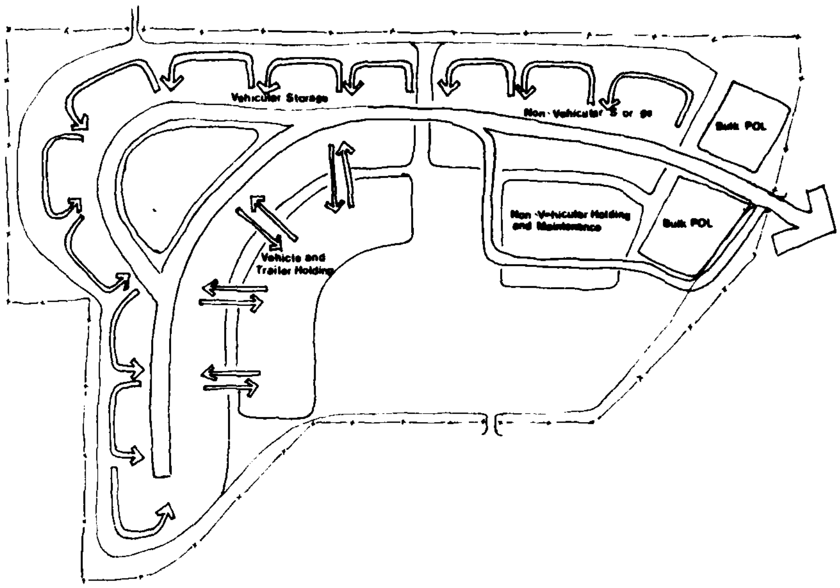
Preliminary Site Plan

POMSS Facility: Emmen, Netherlands

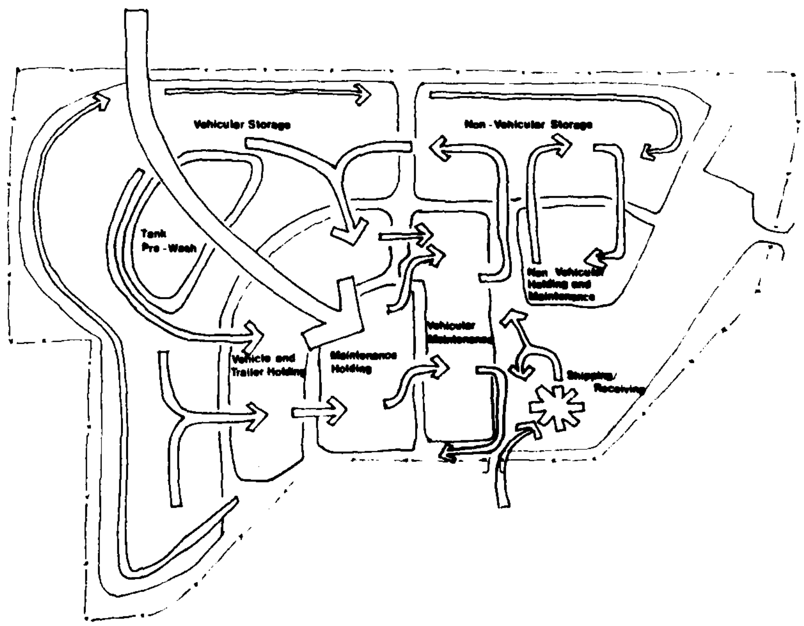


SUPPORT/COMMAND

DI 24 Shipping/Receiving Facility
DI 27 Site Security
DI 29 Site Facilities and Utilities
DI 40 CEC Headquarters



Mobilization Flow



Maintenance Flow

rlands

METERS
FEET

1

POMCUS Site Design Principles

A Proposed Site Plan for Kerkrade, Netherlands

1. DETERMINE SIZE OF SITE:*

This site was assigned 21 CHWs of 40,000 sq. ft. each and the associated maintenance facilities. No ammunition storage was required. The site selected contains approximately 51 hectares.

3. MINIMIZE THE VULNERABILITY OF MULTIPLE FACILITY DESTRUCTION:

The linear nature of the site configuration required arrangement of the CHWs in a "modified" linear scheme.

4. PROVIDE OPTIMAL ISSUE FLOW:

Since this site consists of two separate segments, it was essential to provide a right-of-way across private property to ensure an efficient flow of materiel during an issue. The separation of vehicular and non-vehicular should not impair the effectiveness of issue flow. All flow converges then at the fueling station. "Deadends" and "backing" of vehicles are avoided by providing "turnarounds" at a number of locations, and optimal routes to other storage and hardstand holding areas.

5. EFFICIENT FUELING DURING ISSUE:

Earth berms for 5000-gallon bladders are provided near the terminal point of issue flow on site, with allowance for queuing but not interfering with "through" traffic.

6. PROVIDE OPTIMAL MAINTENANCE FLOW:

This was done by providing adjacent locations for CHWs and the relevant maintenance facilities; i.e., vehicular storage close to vehicular maintenance. Components of vehicular maintenance are arranged to provide for the sequential nature of both REFORGER and normal maintenance activities.

7. EFFICIENT STORAGE FACILITIES:

Allowances for universal access from both ends of CHWs were made.

8. VEHICLE SERVICEABILITY VERIFICATION:

Test track can be incorporated into the perimeter sheet around the CHWs. A test pond was incorporated into the existing creek.

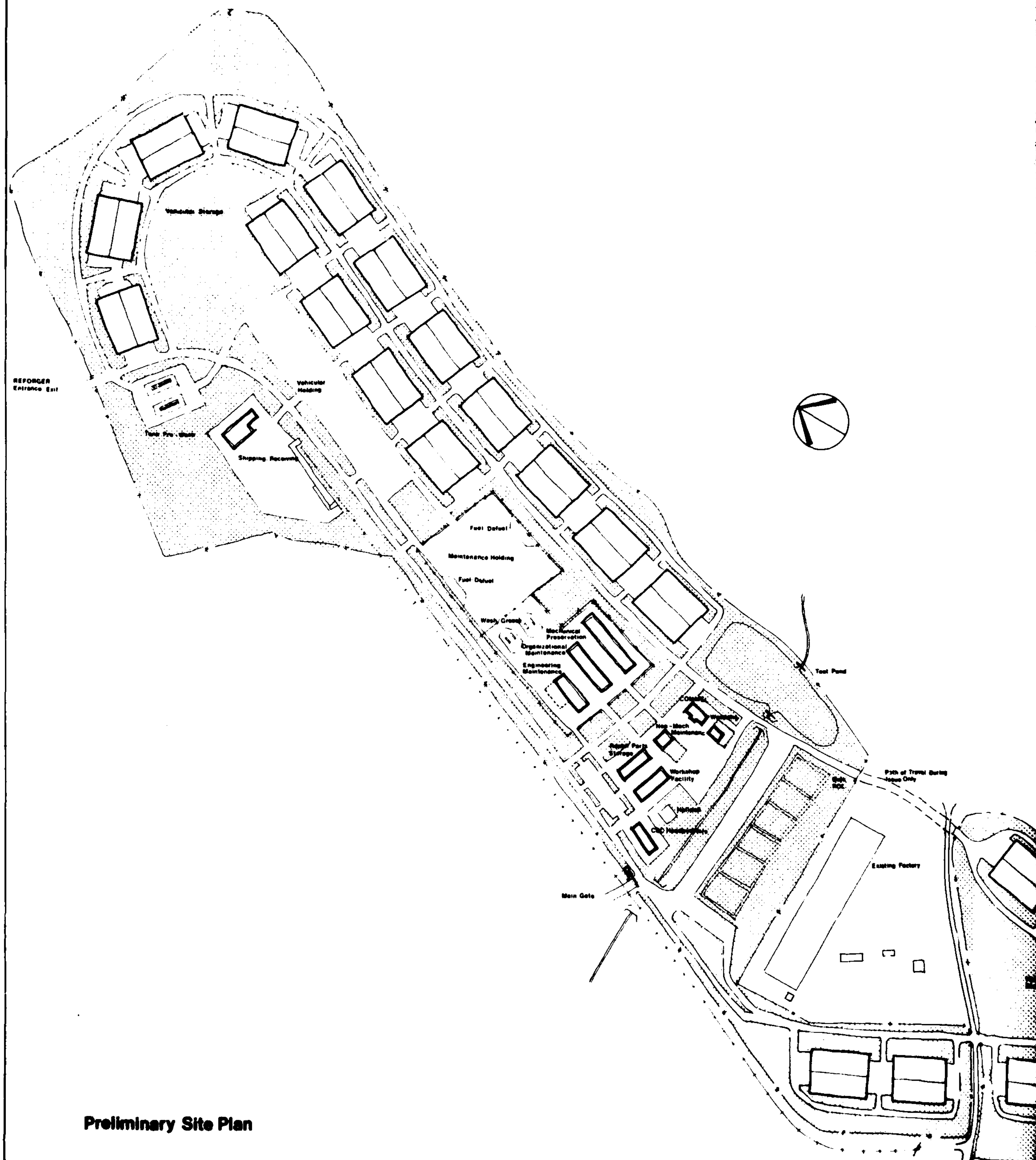
10. EFFICIENT RECEIVING OPERATIONS:

A shipping/receiving building and loading dock are located for convenient access from the main gate for highway deliveries.

11. EFFICIENT PLL AND ASL STORAGE:

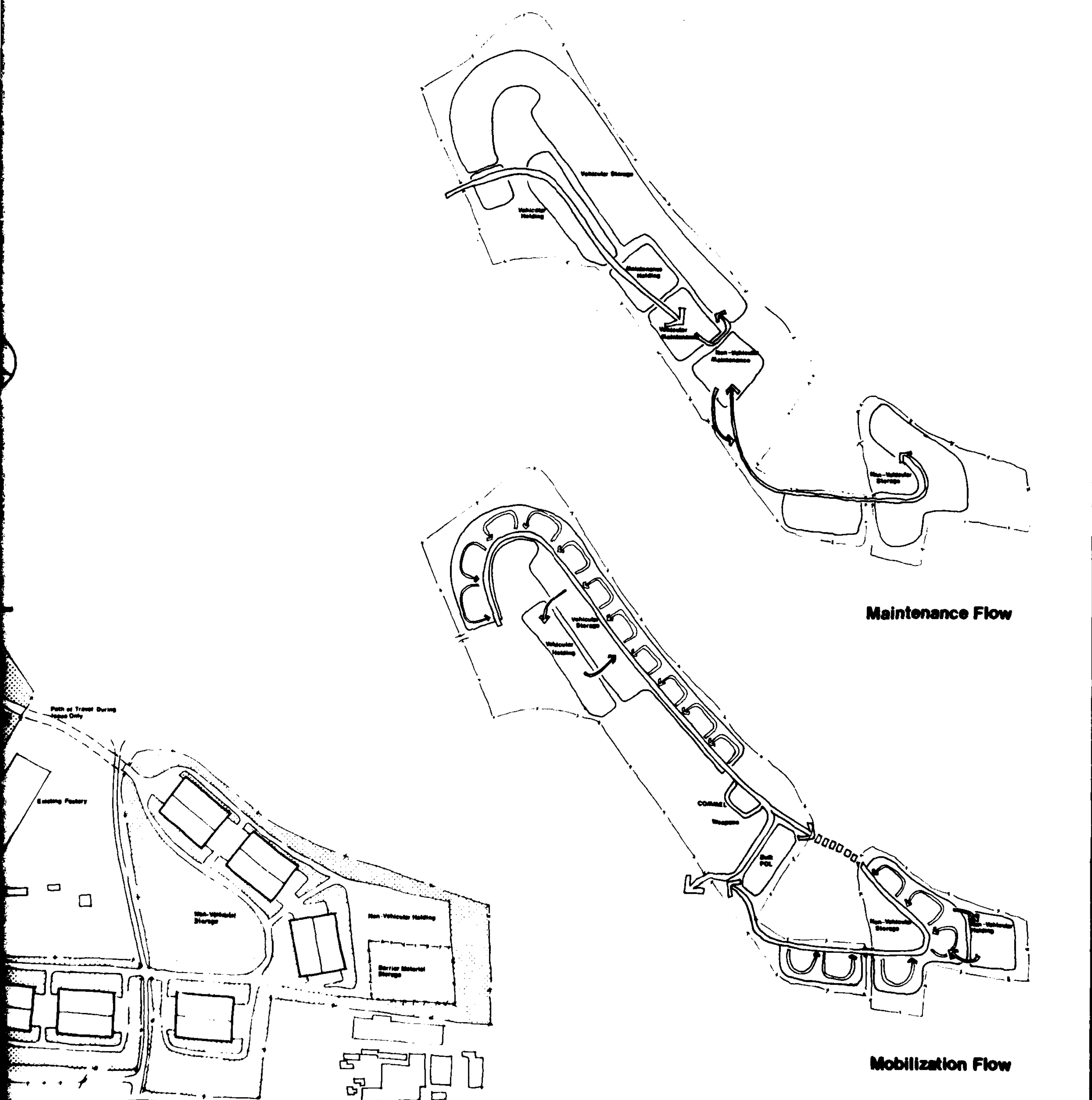
A Repair Parts Storage facility is provided near the maintenance areas and is on the issue flow route.

* See p 46.20 for complete list of POMCUS site design principles 1 through 11.



Preliminary Site Plan

POMSS Facility: Kerkrade, Netherlands



Maintenance Flow

Mobilization Flow

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METERS 0 25 50 100 150 200 250

FEET 0 100 200 400 600 800

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2

POMCUS Site Design Principles

A Proposed Site Plan for Grobbendonk, Belgium

46.39

1. DETERMINE SIZE OF SITE:*

This site was assigned eight CHWs of 40,000 sq. ft. each and the associated maintenance facilities. No ammunition storage was required. The site selected contains approximately 32 hectares of usable site (not including marsh area).

3. MINIMIZE THE VULNERABILITY OF MULTIPLE FACILITY DESTRUCTION:

Placing CHWs in large blocks or long straight lines was avoided in this scheme.

4. PROVIDE OPTIMAL ISSUE FLOW:

Issue flow begins with the vehicular storage CHWs and vehicular holding areas, and moves in a one-way direction through non-vehicular storage and holding, providing a branch route for weapons and COMMEL equipment. All flow converges then at the fueling station. "Deadends" and "backing" of vehicles are avoided by providing "turnarounds" at a number of locations and optimal routes to other storage and hardstand holding areas.

5. EFFICIENT FUELING DURING ISSUE:

Earth berms for 5000-gallon bladders are provided near the terminal point of issue flow on site, with allowance for queuing but not interfering with "through" traffic.

6. PROVIDE OPTIMAL MAINTENANCE FLOW:

This was done by providing adjacent locations for CHWs and the relevant maintenance facilities; i.e., vehicular storage close to vehicular maintenance. Components of vehicular maintenance are arranged to provide for the sequential nature of both REFORGER and normal maintenance activities.

7. EFFICIENT STORAGE FACILITIES:

Allowance for universal access from both ends of CHWs was made.

8. VEHICLE SERVICEABILITY VERIFICATION:

Test track can be incorporated into the perimeter sheet around the CHWs.

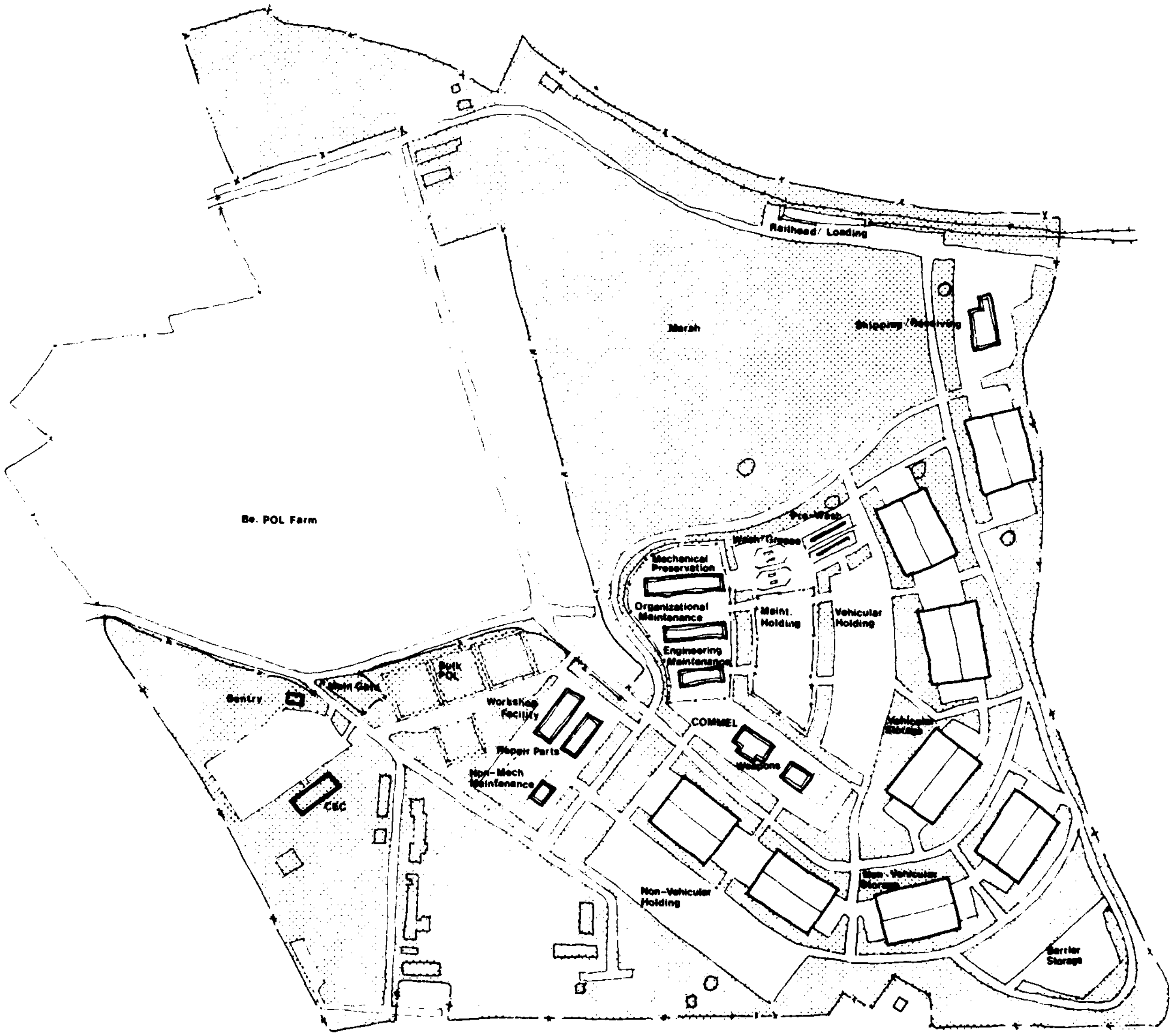
10. EFFICIENT RECEIVING OPERATIONS:

A shipping/receiving building and loading dock are located for convenient access from the main gate for highway deliveries.

11. EFFICIENT PLL AND ASL STORAGE:

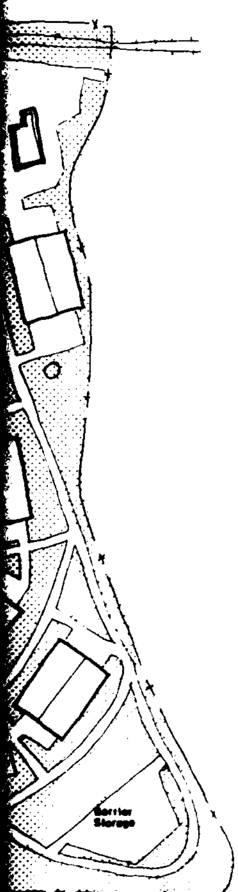
A Repair Parts Storage facility is provided near the maintenance areas and is on the issue flow route.

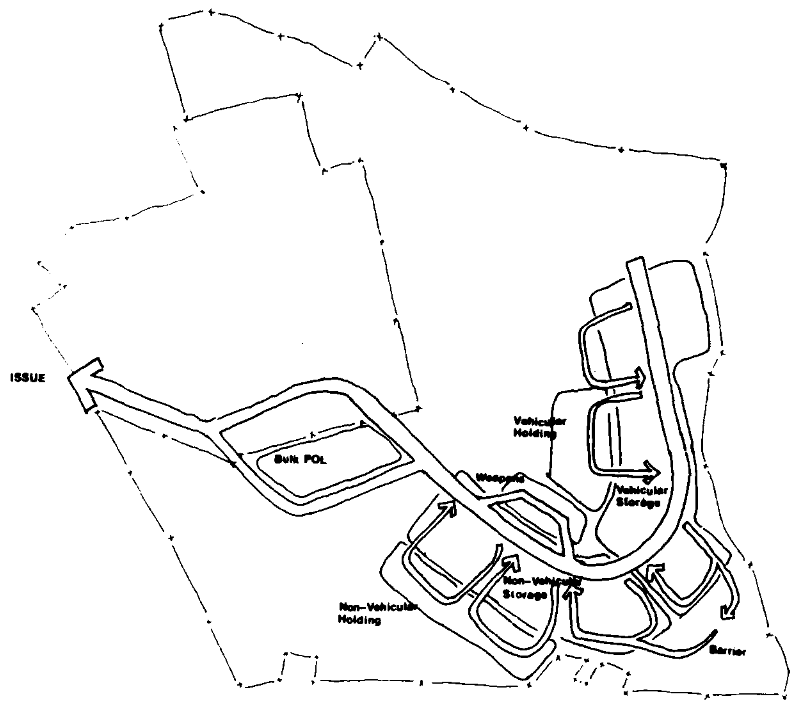
* See p 46.20 for complete list of POMCUS site design principles 1 through 11.



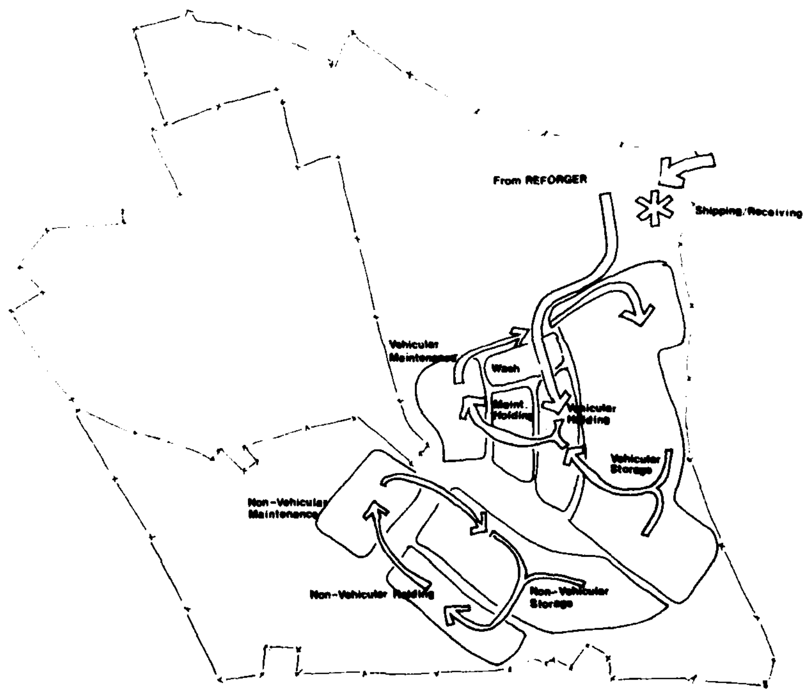
Preliminary Site Plan

POMSS Facility: Grobbendonk, Belgium





Mobilization Flow



Maintenance Flow

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METERS 0 25 50 100 150 200 250

FEET 0 100 200 400 600 800

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Porter, Robert L.
Type II forward storage site facilities: POMCUS system. -- Champaign, IL : Construction Engineering Research Laboratory ; Springfield, VA : available *from* NTIS, 1980.
2 v. (Technical report ; P-112)

1. POMCUS. 2. U.S. Army - equipment. I. Title. II. Series: U.S. Army Construction Engineering Research Laboratory. Technical report; *P-112*.